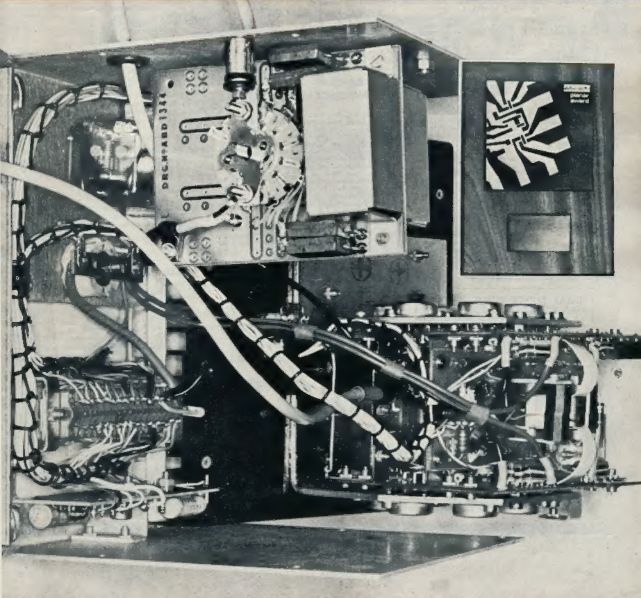
amateur radio

Vol. 38, No. 12
DECEMBER, 1970
Registered at G.P.O., Melbourne, for transmission by post as a periodical
Price 30 Cents



amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

DECEMBER, 1970
Vol. 38, No. 12

Publishers:
VICTORIAN DIVISION W.I.A.
Reg. Office: 478 Victoria Parade, East Melbourne, Vic., 3002.

Editor:
K. E. PINCOTT VK3AFJ

Assistant Editor:
E. C. Manifold VK3EM

Publications Committee:
Ken Gillespie VK3GK
Harold Hepburn (Secretary) VK3AFQ
Peter Ramsay VK3ZWN
W. E. J. Roper VK3ARZ

Circulation—
Jack Kelly VK3AFD

Draughtsmen:—
Clem Allan VK3ZIV
John Blanch VK3ZOL
John Whitehead VK3YAC

Enquiries:
Mrs. BELLAIRS, Phone 41-3535, 478 Victoria Parade, East Melbourne, Vic., 3002. Hours: 10 a.m. to 3 p.m. only.

Advertising Representatives:
TECHNICAL NEWS PUBLICATIONS
21 Smith St., Fitzroy, Vic., 3065. Tel. 41-4962.
P.O. Box 108, Fitzroy, Vic., 3065.

Advertisement material should be sent direct to the printers by the first of each month.

Hamads should be addressed to the Editor.

Printers:
"RICHMOND CHRONICLE," Phone 42-2419.
Shakespeare Street, Richmond, Vic., 3121.

★

All matters pertaining to "A.R." other than advertising and subscriptions, should be addressed to:

THE EDITOR,
"AMATEUR RADIO,"
P.O. BOX 36,
EAST MELBOURNE, VIC., 3002.

★

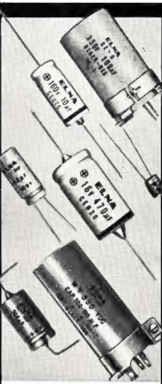
Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

CONTENTS

COVER STORY

Our front cover this month shows what is claimed to be the first commercially available, fully solid state, 100 watt linear high frequency amplifier in the world. The unit, manufactured by Racal (Aust.) Pty. Ltd., won the Fairchild Planar Award for 1970. Full story on page 18.

REALISTIC
DX-150



SIDEBAND ELECTRONICS ENGINEERING

YAESU-MUSEN—FT-101 AC/DC all-band solid state Transceiver, expected around Xmas time, latest model, with PTT mike $650
FT-DX-400 de luxe AC Transceiver, still only $525
FT-200 all-band economy Transceiver, with AC supply-speaker unit in kit form, special package offer $375
FT-200 with assembled AC supply-speaker unit, only $390
FL-DX-2000 Linear Amplifier $225
FL-2000B Linear Amplifier with American import tubes 572B $350
FL-DX-400 all-band Transmitter $350
FR-DX-400 de luxe Receiver $375
FR-DX-400 super de luxe Receiver, with all available accessories, 6 and 2 mx converters, CW filter, FM filter and FM discriminator, factory built-in $475
FC-6 or FC-2 solid state converters .... each $25
FF-50-DX low pass co-ax. line filter, only $15
500 Hz. CW filter, Kokusai, as used in the FR-DX-400 .... $20

SWAN—SW350C with Swan 14-230 AC/DC power supply $600

HY-GAIN—Hy-Quad, triband cubical quad, 10-15-20 metres, with gamma-match for one co-ax. feed-line, 1 kw. power $130
TR3JR triband junior, 10-15-20 metre beam $120
TH6DXX triband senior, 10-15-20 metre beam, six elements $220
Special package deal: TH6DXX with balun, CDR Ham-M rotator and control unit with 50 yards 8-cond. cable $400
14AVQ, 10 to 40 metre four-band vertical, 1 kw. $52

MOBLEY—TA33JR triband, 10-15-20 metre junior beam $105

NEWTRONICS—4-BTV 10 to 40 metre four-band vertical, 1 kw. $80

MOBILE WHIPS—WEBSTER Bandspanner, 10 to 80 mx centre-loaded, continually adjustable $55
MARK HW-40 helical whip for 40 metres only $20
MARK HW-3 triband helical whip for 10-15-20 metres $35
Swivel mount for flat surface mounting, with spring $10

TRANSFORMERS, CHOKES.—All new ones, made by **National** Co. of Kingsgrove, N.S.W., limited stock. U60/325 325-0-325 60 mA. 5 and 6v. $1.25; U60/385 385-0-385 60 mA. 5 and 6v. $1.25; U60/385 385-0-385 80 mA. 5 and 6 and 6v. $1.50; 9158 0-240 50 mA., 6v. 1.5a. $0.75; 9716 240-240 50w. isolation transf. 0.75; various transistor output and interstage transf. $0.50 each; chokes 30H. 60 mA., 15H. 150 mA., $1.00 each. Add enough for freight or postage, they are heavy!!!

ROTATORS—CDR Ham-M heavy duty rotator with indicator-control unit, for up to 2 inch masts, the proven rotator since 1955 .... $165
8-conductor control cable for same, ... per yard $0.60
Note the special package offer with Hy-Gain TH6DXX.

ANTENNA NOISE BRIDGE—OMEGA TE-7-01 Bridge, for the serious experimenter, gives resonance and impedance in one operation $25

CRYSTALS—FT-241 channels 0-79, full box of 80 xtals 375/515 KHz. $15
Individual channel crystals, $0.20 to $2.00, depending on frequency required, 455 KHz. the dearest.

BALUNS—Exact electrical duplicate of the Hy-Gain BN-86 .... $12.50

MIDLAND PRODUCTS—Type 13-710 One Watt Transceiver, P.M.G. approved model for 27.240 KHz., operation under special licence, will accept 27 and 28 MHz. Amateur band crystals, 3 channels, with batteries, earphone, carrying case, audio squelch control, battery voltage meter, complete, only $37.50
Type 23-135B Field Strength Meter, with five ranges tunable from 1 to 300 MHz., with telescoping whip $10
Type 23-136 SWR-POWER Meter, dual meters 100 micro-amp., very sensitive for low powers but good for 1 kw. max., up to 175 MHz., reads forward and reflected power simultan., 52-ohm imped. $20
Type 23-126 SWR Meter, standard 52-ohm type, good for up to 1 kw., with telescoping whip to be used for field strength meter $12
PTT Dynamic hand Microphone, steel case, 50K impedance, with coiled cord and mobile clip $10
Ceramic table-type Microphone, with PTT bar $15
Same Microphone, built-in pre-amp. for up to 50 dB. amplification $25
Co-ax. Connectors, Midland type PL-259 male, SO-239 female, with and without flange, PL-258 double female .... per connector, all each $0.75
Co-ax. Inserts for the PL-259 for thinner than RG-8U co-ax. cable $0.20

CO-AX. CABLES.—Type RG8U, 3/8 inch diam., 52-ohm .... per foot $0.20
Type RG58U, 3/16 inch diam., 52-ohm .... per foot $0.10
Type RG214U 3/8 inch diam., 52-ohm, silvered conductors, extra heavy braid, for VHF lower losses .... per foot $0.30

All prices quoted net cash Springwood, N.S.W., subject to alteration without prior notice; sales tax included in all cases; postage, freight and insurance not!

SIDEBAND ELECTRONICS ENGINEERING

Proprietor: ARIE BLES

Telephone: **Springwood** (STD 047) 511-394,
not part of the Sydney telephone exchange

P.O. BOX 23, SPRINGWOOD, N.S.W., 2777

EDDYSTONE — EC10

TRANSISTORISED COMMUNICATIONS RECEIVER

Completely Portable — Battery Operated

RUGGED — COMPACT — LIGHT

Designed for Commercial and Amateur use

Ideal for Marine purposes and remote operational areas

The EDDYSTONE EC10 is a fully transistorised communications receiver of reasonably small size and giving excellent performance between 550 KHz. and 30 MHz. in five bands. The receiver accepts CW and AM signals and though not specifically designed for SSB reception, it operates in this mode as well. The EC10 may also be powered from internal dry cells or mains units.

Covers local broadcast band, international short-wave news service, and marine frequencies, as well as citizens band.

Frequency Coverage

Ranges:—(1) 16.0 - 30.0 MHz., (2) 8.5 - 16.0 MHz., (3) 3.5 - 8.5 MHz., (4) 1.5 - 3.5 MHz., (5) 550 - 1500 KHz.

Write for fully illustrated technical brochure

R.H. Cunningham PTY. LTD.

Vic.: **608 Collins Street, Melbourne, Vic., 3000.** Phone 61-2464
N.S.W.: **64 Alfred Street, Milsons Point, N.S.W., 2061.** Phone 929-8066
W.A.: **34 Wolya Way, Balga, Perth, W.A., 6061.** Phone 49-4919
Qld.: **L. E. Boughen & Co., 30 Grimes St., Auchenflower, 4066.** Ph. 70-8097

FEDERAL COMMENT:

AN IMPORTANT SPEECH

The Annual Dinner of the Wireless Institute of Australia, Victorian Division, was held on Wednesday, 28th October. Amongst the guests were Mr. E. J. Wilkinson, Assistant Director-General Radio, and Mr. H. Young, Controller, Radio Branch. Also present was Mr. Bob Booth, W3PS, the General Counsel of the American Radio Relay League.

The toast to the Institute was proposed by Mr. Wilkinson and his speech in proposing the toast is of general interest. Mr. Wilkinson commenced by referring to the fact that this was the sixtieth year of the Wireless Institute. He pointed out that 1970 was significant for other reasons. Firstly, Australis Oscar-5 had been launched in 1970 which he described as probably the most meritorious effort in the history of the technical side of the Wireless Institute. He congratulated those concerned on their achievement and wished them "Good luck with the next one."

Mr. Wilkinson also pointed out that 1970 is the year of the skirmishing and behind-the-scenes lobbying in preparation for the 1971 World Administrative Radio Conference on Space Communications. He said that the Wireless Institute of Australia is in the front rank fighting for Amateurs' rights, seeking new spectrum above 20 GHz. and protecting its "real estate" below that frequency. Significantly, Mr. Wilkinson said that he believed that the Institute is holding its own—"Its performance to date certainly measures up with the other efforts in this area that we have seen from the Australian Post Office side".

He said that the Australian Post Office was conferring with the various users of radio frequency and many of these would jump at some of the precious areas that are at present allocated to the Amateur Service. Mr. Wilkinson said, quite bluntly, that one of the pressures on the Post Office was the claim by these other users that the Amateur Service was not using its allocations. Once again I quote from what Mr. Wilkinson said:

"We know you're doing your best to hold on to the areas that you already have and enjoy—would you please help by making use of them! You may have seen some of the statements about the number of signals on the air in the 144 MHz. band and the 432 MHz. band. If ever there was a time for the Australian Amateur to make plenty of use of these v.h.f., low u.h.f. and even the higher u.h.f. bands that adjoin some of the areas that are being used by the space people, then this is the year and this is the time."

Then Mr. Wilkinson referred to a matter that is of far reaching significance in Amateur circles. I propose again to quote his words, but before doing so, this matter requires some little explanation. The allocation 7-7.1 MHz. is allocated on a world-wide basis exclusively to the Amateur Service. In Region III. and Region I., the band 7.1-7.3 MHz. is allocated to the broadcasting service. In Region II. that area is allocated exclusively to the Amateur Service. Early this year the Institute made representations to our Administration to extend the Australian Amateur allocation (which is 7-7.1 MHz. exclusive and 7.1-7.15 MHz. shared) to 7.3 MHz., thus bringing our allocation in line with the allocations in the United States of America and other Region II. countries.

In the course of his speech, Mr. Wilkinson made the first public reference to this representation: "Dare I mention the 7 MHz. band which will probably be dear to a few people's hearts. It is perhaps strange that at the time that the space frequencies are being talked about, there is a strong feeling in the Australian Post Office that we ought to do something about bringing Australia into line with Region II. in that precious 7.1-7.3 MHz. area. Let's hope we can do something. You know it's a Region III. problem, not just Australia, but it might be some comfort for you to know that the Australian Post Office at least is hoping that it can swing this deal and help you to get back on an equal footing with Region II."

No doubt Mr. Wilkinson's comments are guarded in the extreme. Personally, I attach great significance to them and I hope that we may look forward to a time in the not too distant future when the Australian Amateur Service is able to use the 40 metre band up to 7.3 MHz.

Mr. Wilkinson concluded by congratulating the office-bearers of the Wireless Institute of Australia. He said that it was a great help to the Post Office to be able to deal with a united body—a group of people who they know represent the interests of the whole Amateur fraternity. He said that it would be a hopeless situation if they had to try and deal with individuals or with groups who were not as united as the Wireless Institute is. He said: "It's a credit to the members and to the office-bearers that we are able to get well reasoned and well represented cases and discuss them frankly and openly and come to what we believe to be a reasonable decision."

I know that Mr. Wilkinson regarded what he said in his speech as being of special significance. It is because I share that view that I have taken the unusual course of quoting from his speech at some length.

—MICHAEL OWEN, VK3KI,
Federal President.

VK3 V.H.F. GROUP V.H.F. PRE-AMPLIFIER, MARK II.

This article has been essentially published to inform interested Amateurs of the changes in design and construction of the very successful v.h.f. pre-amplifier that originally appeared in "Amateur Radio" of July 1969. A great many enthusiasts have constructed this simple unit for operation within the Amateur bands, and more than a handful have been used in mobile radios by establishments outside the Amateur sphere of interest.

In response to suggestions by some interested Amateurs, we have undertaken to modify the old circuit and to include these in the new design. The suggestions were mainly concerned with protection of the semiconductor, however, as this required a change in the printed circuit design, we decided to examine the possibilities of further changes. By substituting a TIS88/2N5245 in place of the device originally used, we have now brought this unit into line with our two metre and 70 centimetre converters.

This device (TIS88) has been found to be totally reliable and exhibits more than enough desirable characteristics. Further, this would reduce the need to carry a wide range of semiconductor devices that essentially do the same operation.

Throughout these modifications, we have kept in the foreground of our consideration the basic requirements for the effort necessary in making changes mentioned above.

The design objectives of the pre-amplifier were:

(a) Best noise figure possible consistent with reasonable cost.

(b) Sufficient gain so that the system noise figure is determined by the pre-amplifier.

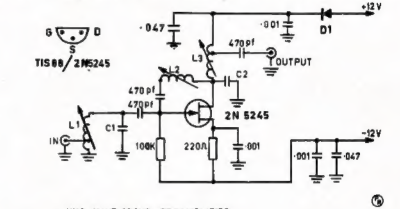
PERFORMANCE

Once again noise figures of better than 2dB. have been obtained on both 2 and 6 metres. The gain on 2 metres is usually in excess of 18 dB. with gains of 22 dB. quite common. The gain on 6 metres, although not accurately measured, would as a function of the device parameters be slightly more.

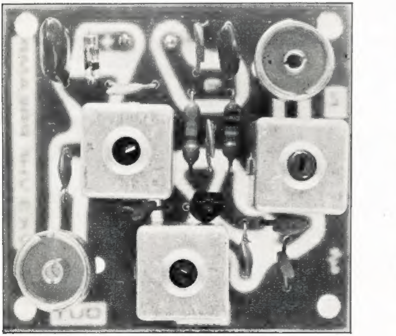
DESCRIPTION

The pre-amplifier uses an TIS88/2N5245 JFET (Texas) in neutralised common source configuration. Neutralisation is accomplished by adjustment of L2, which resonates with the drain to gate feedback capacitance to form a high impedance parallel tuned circuit at the operating frequency.

A supply of 6-15 volts is required. The design voltage is 12 volts, at which it draws approximately 4 mA. Positive and negative supply rails are d.c. isolated from earth, allowing operation with either polarity earth. The input and output impedances are 50 ohms, although the mismatch of a 70-ohm termination is negligible. The pre-amplifier may be left on during transmission periods. This will prevent changes in junction temperature detuning the pre-amplifier at switch-on.



VK3 V.H.F. GROUP PREAMPLIFIER.



The pre-amplifier is constructed on a small (2" x 2¼") glass epoxy board. All capacitances below 1,000 pF. are NPO disc ceramics. Above 1,000 pF., Hi-K disc ceramics are used. Resistors up to ½ watt rating are suitable.

The coil formers used are Neosid Type A (single assembly) with F29 (v.h.f.) slugs. The bases usually provided have not been used, so as to maintain high unloaded tuned circuit Q. Instead, the boards are drilled 7/32" and the formers glued in. Coil details are given elsewhere.

APPLICATIONS

Use of the pre-amplifier will result in an improvement in noise figure over even the best valve type front ends, and most transistor and FET converters. In addition, the pre-amplifier may be employed to increase overall gain to a satisfactory level.

A great improvement will result when the pre-amplifier is used ahead of the front-end of a "carphone"[1] Most "carphones" use a 6AK5 r.f. amplifier. The best noise figure that can be expected of this tube on 2 metres is 8 dB., but a more likely figure is 11 dB.[1] The improvement at 6 metres is less pronounced, but nevertheless worthwhile.

A word of warning is necessary in connection with "carphones". Some

"carphones" do not use an antenna change-over relay. Unless a change-over relay is installed the pre-amplifier will be damaged by excessive r.f. voltage. Installation of a change-over relay in these cases is recommended.

Similarly, the change-over relays used in a few higher power "carphones"—mainly to 25w. 3/20 type—have inadequate isolation between contacts. Damage may be prevented by connection of back-to-back diodes from input socket to earth, on the copper side of the printed circuit board. Almost any small signal diode, such as the OA95, will be adequate. This addition results in only a slight decrease in performance.

CONSTRUCTION

The Neosid coil formers should be mounted first. File off the locating lands and glue the formers in place, making sure that the slugs will line up with the position of the cans. When the glue has hardened, the coils may be wound and the cans soldered in place, after which the remaining components may be mounted.

Ensure that all earth connections to the board are removed prior to soldering in the FET. Although no special handling precautions are necessary, for best performance the FET should be pressed down to within 1/8" of the board. For soldering, a Scope soldering iron with clean pointed instrument tip is suitable.

COIL DETAILS

Two Metres

C1—3.3 pF.

C2—3.3 pF.

L1—input coil, 22 S.W.G. tinned copper wire, 5½ turns tapped ¾ turn from cold end (cold end being that end closest to the board).

L2—neutralising coil, 30 or 32 B. & S. enamelled copper wire, 19 turns close wound on board end of the former.

L3—output coil, 22 S.W.G. tinned copper wire, 5½ turns tapped 1¾ turns from cold end.

Six Metres

C1—10 pF.

C2—10 pF.

L1—input coil, 26 B. & S. enamelled copper wire, 10 turns tapped 2¾ turns from cold end of coil.

L2—neutralising coil, 32 B. & S. enamelled copper wire, 46 turns close wound.

L3—output coil, 26 B. & S. enamelled copper wire, 11½ turns tapped 3 turns from cold end of coil.

ALIGNMENT

With the pre-amplifier mounted in its final position, connect the supply voltage. Peak L1 and L3 for maximum gain (or in a "carphone" maximum limiter current on a weak signal), adjusting the neutralising coil (L2) where necessary to restore stability.

A number of kits will be made available by the Disposals Committee of the W.I.A. Vic. Div. Only one type of kit will be assembled, each kit containing two superfluous capacitors for the band not required. Kits will include all components—board, resistors, capacitors, FET, wire, sockets, etc. The cost will be $6.00 including postage.

Enquiries should be addressed to:

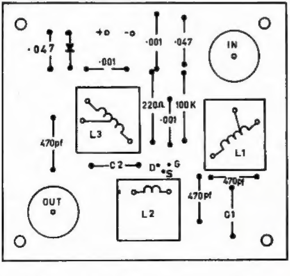
"V.H.F. Pre-Amp.,"
W.I.A., Vic. Div.,
P.O. Box 36,
East Melbourne, Vic., 3002.

ACKNOWLEDGMENTS

We wish to acknowledge the original contribution to this project by the Projects Committee of the VK3 V.H.F. Group.

REFERENCES

(1) Orr and Johnston: "V.H.F. Handbook".
(2) "The Real Meaning of Noise Figure," Kennedy. "Ham Radio," March 1969.
(3) "VK3 V.H.F. Group Two Metre Converter," "Amateur Radio," February 1969.
(4) Goodman: "Improved F.M. Operation," "Amateur Radio," April 1969.



LAYOUT OF V.K.3 V.H.F. GROUP PREAMPLIFIER.

CARBON POTS.

— . . . —

PROVISIONAL SUNSPOT NUMBERS

AUGUST 1970

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa

Day	R	Day	R
1	77	16	100
2	68	17	99
3	64	18	106
4	59	19	113
5	65	20	117
6	68	21	117
7	72	22	108
8	82	23	101
9	76	24	116
10	71	25	106
11	75	26	114
12	73	27	91
13	92	28	101
14	94	29	114
15	106	30	120
		31	111

Mean equals 93.9.

Smoothed Mean for Feb. 1970: 106.7.

SEPTEMBER 1970

Dependent on obseravtions at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	96	16	68
2	104	17	65
3	110	18	75
4	111	19	98
5	114	20	114
6	133	21	129
7	136	22	109
8	128	23	104
9	116	24	129
10	103	25	114
11	73	26	107
12	76	27	67
13	73	28	88
14	76	29	81
15	75	30	77

Mean equals 98.8.

Smoothed Mean for March 1970: 106.8.

Predictions of the Smoothed Monthly Sunspot Numbers

October	94	January	88
November	92	February	86
December	90	March	84

—Swiss Federal Observatory, Zurich.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. Drawings will be done by "A.R." staff.

Please address all articles to:

EDITOR "A.R.,"
P.O. BOX 36,
EAST MELBOURNE,
VICTORIA, 3002

A SOLID STATE AMATEUR S.S.B. RECEIVER

PART FOUR

*B. G. CLIFT and A. E. TOBIN**

This article describes the design concepts, circuit operation and construction of the second mixer and its associated crystal oscillators.

In Part One of this series, mention was made of the bands to be covered, and we must point out than an error appeared in the specification for the frequency coverage of the 10 metre band. This should read 28.0-28.5 MHz. and 28.5-29.0 MHz. Obviously a continuous coverage of 1 MHz. is more useful if it is desired to cover the v.h.f. bands with a suitable converter.

Injection frequencies for the second mixer have been chosen carefully in order to minimise the effect of spurious responses generated by the beating of higher order harmonics producing difference frequencies which may lie within the receiver pass band. In addition, it was felt that the number of crystals required should be kept to a minimum in accordance with the overall design concept.

Table 1 shows the selected crystal oscillator frequencies used for the various bands and the output frequencies from the second mixer feeding the first mixer (refer to Fig. 1 in Part One).

The v.f.o. tuning capacitor is coupled to the dial assembly so that clockwise rotation of the tuning knob (and consequently left to right movement of the dial pointer) produces backward tuning of the v.f.o. This arrangement produces forward tuning on bands 1, 2, 5 and 6.

* Applications Laboratory, Fairchild Australia Pty. Ltd., 420 Mt. Dandenong Road, Croydon, Vic., 3136.

CIRCUIT DESCRIPTION

The crystal oscillator and mixer 2 have been assembled on the one plug-in printed circuit board. All switching of crystals and tuned circuits associated with both sections is achieved using diodes.

The circuit configuration of the crystal oscillator is of the Colpitts type similar to that used in the v.f.o. The tank circuit is fixed tuned to 25 MHz. with a 33 pF. ceramic capacitor, the resonant frequency being reduced to 24.5 MHz. or 21.5 MHz. by switching additional shunt capacitance across the coil.

The coil is wound on a Neosid type "A" former and consists of a primary of 14 turns of 26 B. & S. enamelled wire with a 3-turn link wound over the low impedance end of the primary. The coil is fitted with a tuning slug and mounted in the normal Neosid can, but no cup or ring is used. Output from the oscillator is coupled directly into the second mixer via the 3-turn link.

The diode switching of crystals and the tank circuit is performed using standard 1 x 12 switch wafers which are assembled on a clicker plate with the ball bearings and stop removed. The switch assembly is mounted at the rear of the turret tuner and connected to the tuner shaft via a small flexible coupling. Two wafer sections are required for switching the crystals and tuned circuits of both the crystal oscillator and the second mixer. An additional wafer is required for switching the v.f.o. output between the first and second mixers.

Although only three wafers are required for the receiver, it is worth considering the addition of a further three or four wafers and the use of a clicker plate with a longer shaft if it is contemplated adding an s.s.b. exciter at a later date. This would obviate the necessity of dismantling the front end for future modifications.

It should be pointed out at this stage that the turret tuner used is an early

Band No.	Coverage	Xtal Osc.	Mixer 2 Output	Mixer 1 Output	Tuning Mode
1*	3.5 – 4.0 MHz.	——	——	9.0 MHz.	Forward
2	7.0 – 7.5 „	21.5 MHz.	16.0 – 16.5 MHz.	9.0 „	Forward
3*	14.0 – 14.5 „	——	——	9.0 „	Backward
4	21.0 – 21.5 „	25.0 MHz.	30.0 – 30.5 MHz.	9.0 „	Backward
5	28.0 – 28.5 „	24.5 „	19.0 – 19.5 „	9.0 „	Forward
6	28.5 – 29.0 „	25.0 „	19.5 – 20.0 „	9.0 „	Forward

Table 1.

* For Bands 1 and 3, Mixer 2 is not used, the V.F.O. being coupled directly into Mixer 1.

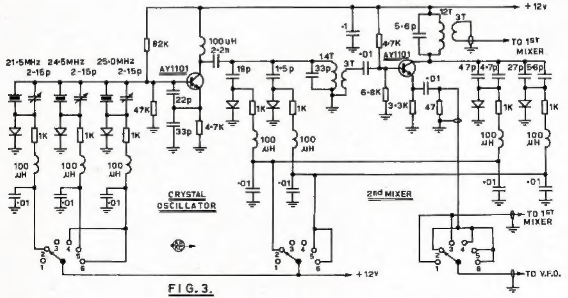


FIG. 3.

model Philips twelve channel tuner which has about ½" of the main shaft protruding from the rear. Only six of the available twelve switch positions are used on account of the physical size of the coils used for the lower frequency bands.

It is, however, feasible to provide additional bands at the high frequency end if adjacent switch positions are used above 14 MHz. For example, a further 1 MHz. of the 10 metre band could be covered which would then provide a full 2 MHz. for this band. This would add to the complexity of the tuned circuit switching arrangements for the crystal oscillator and second mixer and 25.5 MHz. and 26.0 MHz. crystals would also be required. Nevertheless, this modification is quite feasible and could be added if desired.

The second mixer uses an AY1101 with a tuned collector circuit, the output being link coupled to the first mixer. The coil is wound on a Neosid type "A" former and consists of 12 turns of 26 B. & S. enamelled wire with a 3-turn link wound over the low impedance end. This coil is also fitted with a tuning slug and mounted in the normal can, but no cup or ring is used.

The tank circuit is tuned to 30.25 MHz. with a fixed 5.6 pF. ceramic capacitor. An additional 32.6 pF. is switched across the coil to retune the output to 19.5 MHz. for bands 5 and 6, and 51.7 pF. is used to retune the output to 16.25 MHz. for band 2. The final values used for these shunt capacitors may need slight adjustment, depending on individual layouts. No adjustment should, however, be made until the layout is complete and all switching diodes are installed. The diode selected for all switching functions is the AN2002. This was chosen for its very low capacitance which is typically less than 2 pF.

CONSTRUCTION

No special techniques have been used in the construction of this section. The printed circuit board used is a universal type board which has supply rails feeding all three sections, the top section being plain copper which may be scribed with an engraving tool for r.f. circuitry if desired. However, it was found subsequently that the "dotted" sections are quite suitable for the r.f. circuitry and are easier to use. Supplies of this board may be obtained from Colt Electronics, 61 Wise Ave., Seaford, Vic.

Fig. 2 shows a photograph of the completed board. On the top section is the crystal oscillator and on the lower section is the second mixer. Not shown are the two r.f. chokes associated with the output tuned circuit of the oscillator. These are mounted on the copper side of the board. The crystals used were Hy-Q miniature type K and these were soldered directly into the circuit. Output from the v.f.o. (via the switch) is coupled to the second mixer using a length of 50 ohm co-ax. which was soldered directly to the circuit.

Similarly, the second mixer output to the first mixer is also via a length of 50 ohm co-ax. soldered directly to the board. To facilitate removal of individual boards, miniature printed circuit type 50 ohm co-ax. sockets may be used instead. Lengths of 50 ohm co-ax. should then be made up with corresponding plugs at each end to interconnect the various r.f. modules.

R.f. chokes used are Aegis single-section miniature 100 μH., but the value of inductance is not critical.

The next article will deal with the r.f. amplifier and first mixer, which are constructed on the turret.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
757	I1YRK	801	WA4VJW	845	AX3WQ
758	W0GYM	802	PZ5RK	846	W1IDA
759	W1BPY	803	ZL1BHQ	847	I1FLN
760	W9CL	804	I1WRP	848	AX3ANO
761	JA1HBC	805	ZM1BFR	849	WA6VOX
762	SP6BZ	806	AX6JK	850	G3GGG
763	DK3SD	807	WA1JHQ	851	W9QFQ
764	AX2FJ	808	AX4KO	852	AX2IQ
765	DK2HY	809	G2BYI	853	W4DUP
766	W1BTU	810	K2SQM/VE1	854	YV4WT
767	WA7CEN	811	ZM3JU	855	W1MZB
768	AX2AYF	812	W5RW	856	G6UF
769	K1YZW	813	VE3GHL	857	W5OB
770	AX4XY	814	W2EV	858	AX4MY
771	K7VZH	815	AX6KW	859	VE6EO
772	I1VK	816	AX3BAG	860	AX3SX
773	JR1BMU	817	W2GA	861	EA8BK
774	W4ATD	818	AX4UA	862	JA8ARA
775	ZL2ASM	819	G3VW	863	DJ1CG
776	UA0DG	820	YV5DDF	864	W1FLX
777	UB5FG	821	SP2AJO	865	W2WNW
778	UK6AAB	822	WA9EZT	866	G3CDE
779	UW0IX	823	JA1AAT	867	C2IGB
780	AX2AMU	824	AX7UX	868	VE7BLO
781	WA5CBT	825	AX2BMP	869	AX2KA
782	W8IHD	826	WA4YZI	870	AX3BDQ
783	KL7HDB	827	K7MCG	871	AX3MJ
784	VE3AS	828	ZL2BCJ	872	JA1OTE
785	AX3BET	829	G3RUV	873	AX2BMB
786	AX2BAS	830	KP4DFX	874	VE2WY
787	W4CZS	831	OK1TA	875	WA4YVQ
788	W4YOK	832	K0RTH	876	VR2EQ/M
789	AX2AGF	833	W1AX	877	ZL4BG
790	VE3EGT	834	JH1HWN	878	SM6CWK
791	DL2VS	835	K7DXJ	879	K4MG
792	I1YV	836	VE3GLO	880	WA5KPL/HR1
793	AX3ATP	837	F3EA	881	I1DVN
794	ZC4MT	838	G3WLX	882	ZS5WH
795	AX3ALM	839	YT3EM	883	W5MAE
796	W2AJ	840	DL1QT	884	ZL1BKE
797	VE2ANS	841	G5LGN	885	K2DT
798	W0MAN	842	G3BRW	886	VS6AF
799	OK2DB	843	G2DUP	887	W5YOR
800	WA9SLD	844	K3TUP		

V.H.F./U.H.F. SECTION

The following station has qualified for the Award:

Cert. No. 4—AX3AKR

W.I.A. V.H.F.C.C.

New Member:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
76	VK7DK	109	—
77	VK7DK	—	153

Amendment:

Cert. No.	Call	52 MHz.	144 MHz.
44	VK3AMK	157	—
73	VK3AMK	—	109

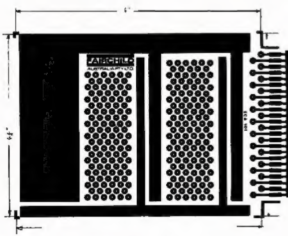


Fig. 1.

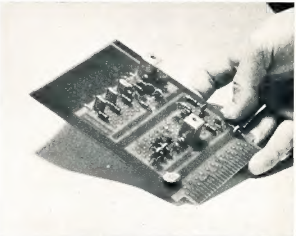


Fig. 2.—Showing printed circuit layout.

A Signal Source for Carphone Receiver Alignment

RON HIGGINBOTHAM, VK3RN*

The May 1969 issue of the Eastern and Mountain District Radio Club journal contained details of an extremely useful little "black box" for the alignment of f.m. carphone receivers. Since it operated from a 12v. 10 mA. d.c. supply, it held obvious attractions as a device that could be used away from power sources other than a car battery as well as in the shack for "ground based" receivers.

Another attraction was the fact that it could provide a low level signal when required (rather than having someone come up and provide carrier for your adjustments and thus occupy a net frequency unnecessarily). Moreover, since the device could use the tx crystal from the set under adjustment, there was no need to buy new crystals for it.

Basically the circuit consisted of a crystal oscillator in the 2-15 MHz. range (which produced copious harmonics useful up to and beyond the 144 MHz. band) and a simple audio oscillator modulating the oscillator by means of a BA102 diode.

The circuit was originally developed by Ken VK3AKK and gave a "high" output for initial alignment and a "low" output for final tweaking to optimum performance.

A Chinese (more or less!) copy was hooked up according to the original article, but did not modulate too well. In retrospect this failure was probably due to the very old crystal used and was no reflection on the circuit as such. However, at the time, this point was not appreciated and Les VK3ZBJ came to the rescue with some minor circuit changes which got the device going. The circuit used is shown in Fig. 1.

The audio side uses a ME1002 transistor as a phase shift oscillator and with the values shown gives about a 500 Hz. note. The crystal oscillator uses a TT (or 2N) 3564 transistor and modulation is effected by the BA102 diode at the ground end of the crystal.

Initial bias on the diode is obtained from the two 47K resistors across the supply rail and initial frequency adjustment is made by means of the variable capacity across the diode. Note that it may be necessary with some diodes to vary the top bias resistor until centre frequency is obtained with the trimming capactior across the diode at half range.

On switching on the modulator the bias across the diode varies at an audio rate. This causes the capacity of the diode to change (also at an audio rate) and in turn the frequency of oscillation varies.

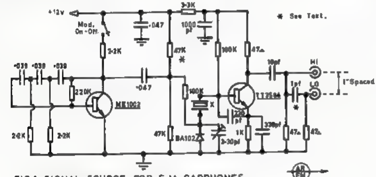


FIG.1. SIGNAL SOURCE FOR F.M. CARPHONES.

The high output is taken via a 10 pF. capacitor from the collector of the crystal oscillator. Originally it was suggested that a "low" output could be obtained from a second (unconnected) output socket located 1" away from the "high" output socket. In my case the coupling was not sufficient and was increased by the 1 pF. capacitor across the two sockets. This capacity can be varied to give a suitable "low" output. In my case this was 60 uA.

Two methods of construction have been used. One uses a printed circuit board and in the other system the components and transistors are mounted on tag strips which are attached to the lid of a small metal box.

In use this device has proven most useful. The only criticism is that the deviation is a little on the low side, but no doubt this could be improved by the use of a higher gain transistor in the audio oscillator, or an adjustment to the base bias. In use this slight lack of deviation has not proven any drawback.

It appears to go well with pretty well any modern crystal in the 2-15 MHz. range, but, as pointed out in the original article, older crystals such as the surplus DC11 series might need a higher gain device such as the 2N3565 in the crystal oscillator. Crystals much below 2 MHz. need different circuitry, which rather rules out the circuit as a 455 KHz. test oscillator.

Besides its utility as a signal source for the alignment of the r.f. and 1st i.f. stages of any 2 or 6 metre carphone of any make, it can also be used to line up the second i.f. stages if they are on a frequency of 2 MHz. or higher. All that is needed is a crystal of the appropriate frequency.

* 43 Eleanor St., Ashburton, Vic., 3147.

CHANGE OF ADDRESS

W.I.A. members are requested to promptly notify any change of address to their Divisional Secretary—not direct to "Amateur Radio".

DISTANCE TABLE FOR ROSS HULL V.H.F. CONTEST

	Syd.	Canb.	Bris.	Melb.	Hob.	Adel.	N.Z.	Dar.	Perth
Sydney	0	160	460	460	660	710	1300/ 1500	1950	2040
Canberra	160	0	600	290	530	670	1300/ 1500	1930	1940
Brisbane	460	600	0	860	1110	990	1500/ 1700	1790	2240
Melbourne	460	290	860	0	400	400	1500/ 1700	1930	1720
Hobart	660	530	1110	400	0	710	1300/ 1500	2280	1880
Adelaide	710	670	990	400	710	0	1900/ 2100	1620	1330
New Zealand	1300/ 1500	1300/ 1500	1500/ 1700	1500/ 1700	1300/ 1500	1900/ 2100	0	2550	3000/ 3200
Darwin	1950	1930	1790	1930	2280	1620	2550	0	1650
Perth	2040	1940	2240	1720	1880	1330	3000/ 3200	1650	0

HARMONICS

LECTURE No. 10A

C. A. CULLINAN,* VK3AXU

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

In our discussions on alternating current in Lectures 5, 6, 7 and 8 we have spoken of sine waves although at the end of Lecture 8 we did introduce the word harmonic.

Apart from this occasion we have assumed that the sine waves have been perfect, that is, if drawn, they would assume the shape of a perfectly drawn sine curve.

However it is very seldom, if ever, that man can produce a perfect sine wave. Admittedly there are sine wave generators which produce almost perfect sine waves. For instance our A.W.A. low distortion oscillator can produce waves which are within 99.9% of perfect and there are very expensive laboratory oscillators which can do even better.

A mechanical device which produces an almost perfect sine wave is a tuning fork.

Some sine wave generators may have as little as 0.001 of 1% distortion. Measurements made of the S.E.C. mains gave a distortion figure of 4%, whilst that of a diesel alternator plant was 10%.

HARMONICS OF MUSICAL INSTRUMENTS

Let us consider some common musical instruments such as a piano, harp and violin. Also let us assume that we have a tuning fork tuned to A440 cycles per second and that using this tuning fork as a reference we tune one of the strings of each instrument to A440. Then each of these strings is tuned to the same frequency, 440 c.p.s. However, if we strike the tuning fork, then play each instrument string we can differentiate between each instrument because each will have a distinctive sound of its own, so we can say "that's a piano" or "that's a harp" and so on.

This is because each string not only vibrates at its fundamental frequency but at a number of multiplies which are known as "harmonics". It is mainly the distribution of these harmonics in relation to the fundamental frequency that gives each instrument its distinctive tone.

This may be more readily understood by comparing the energy distribution given by three musical instruments when playing Middle C = 256 c.p.s. (In concert pitch, Middle C — 273 c.p.s., French Pitch — 261 c.p.s., Scientific Pitch = 256 c.p.s.)

* 6 Adrian Street, Colac, Vic., 3250.

Energy in Percentage

	Flute	French Horn	Violin
Fundamental	13%	2%	60%
2nd Harmonic	40%	10%	8%
3rd Harmonic	10%	50%	20%
4th Harmonic	20%	15%	10%
5th Harmonic	5%	5%	2%
6th Harmonic	2%	2%	0
Remainder	10%	16%	0
Total	100%	100%	100%

From this table it can be seen, quite easily, that (for Middle C) the violin produces 60% of its total energy in its fundamental tone (also known as the 1st harmonic), and the next dominant tone is the third harmonic (256 and 768 c.p.s. respectively). However, the flute produces considerable energy at the second harmonic (512 c.p.s.) together with a considerable amount of energy at the 4th harmonic (1,024 c.p.s.), but the French horn generates half its energy at the 3rd harmonic (768 c.p.s.) whilst the fundamental is only 2%.

It is only right to point out that the instrument is an extension of the player and the sounds produced by a particular player are dependant, not only on his skill, but the quality of the instrument and its acoustic surroundings. The difference between, say, a good violinist and a poor one (using the same violin) lies completely in the subtle harmonic differences of the fundamental notes, which each player produces. Also whilst a good violinist may be able to get better sound from a poor violin he can never get the same sound as from a good instrument.

Whilst dealing with musical instruments it should be pointed out that sound is the subjective result of vibrations in the air, and that such vibrations have a special appeal to our senses when these vibrations are in the form of a sine wave or consists of a number of sine waves which have frequencies related to each other in ratios of small whole numbers such as 1:2, 1:3, 1:4, 3:4, etc.

However, a sound will be discordant if there is no such simple relationship between the frequencies, and if there are a large number of such discords the sound becomes noise.

Referring back to the table for a violin for instance, it will be noticed that this instrument produces harmonics up to the sixth and that these all bear simple ratios.

RADIO HARMONICS

Now all this brings up a major point in audio frequency amplification and radio transmission (telephony).

We have seen that the three musical instruments mentioned in the table each produces a different sound although each is playing the same fundamental frequency, and that this difference in sound is what makes each instrument different. This is true of all musical instruments and is also true of the human voice.

If we are to amplify or to transmit by electrical means music or speech it is essential that we do not change any of the sound of the instruments or the voice which makes the sound, because if we do so, then what we ultimately hear will not be a true reproduction of the original.

To do this it is necessary for us to pass the material through a linear system because if the system is not linear then it will generate additional harmonics which will "colour" the original material if they are strong enough in relation to the particular material, and the resulting sound may become unpleasant to the listener.

So far the discussion has been with frequencies in the audible range, but these remarks also apply to radio transmission where there may be two types of problems.

A radio transmitter generates what is known as a radio frequency wave and if the transmitter is being used for telephony then it is necessary to apply audio frequencies to the radio frequencies by one or more processes known as modulation.

The first problem is that the transmitter may generate harmonics at radio frequencies.

Usually in the interest of efficiency the transmitter will be operated in such a manner that it will generate harmonics and if these are radiated they can cause serious interference to other services.

There are some designs of transmitters where harmonics are deliberately generated, at a lower frequency than that feeding the aerial. This is usually done because it is easier to get good frequency stability at a low frequency than it is at a high one.

Well designed transmitters use considerable shielding, as well as specially tuned circuits or filters, to remove harmonics as far as practicable before they reach the aerial. It must be remembered that an aerial may be designed to resonate at one particular frequency of operation, but it too will radiate harmonics at harmonic frequencies if it is supplied with them, because of insufficient harmonic suppression within the transmitter and aerial coupling circuits.

By its very nature, the oscillator in a transmitter will generate some harmonics, and the following stages of amplification will amplify these if the intermediate tuned circuits cannot remove them, thus they may get through to the final radio frequency stage for further amplification. Therefore a skilful designer will reduce these harmonics to a minimum, nevertheless the final radio frequency amplifier may generate its own crop of harmonics.

The Australian Broadcasting Control Board in its Standards for Technical Operation of Medium Frequency Broad-

casting Stations, 2nd Edition, 18th June, 1968, specifies the maximum field strength of any single frequency spurious emission (no matter what the cause).

Generally the maximum harmonic field strength permitted is 1 mV./m. at one mile from the aerial (A.B.C.B. Standards 50). Alternatively, under the I.T.U. regulations (Geneva 1959) from 1st January, 1970, the mean power of any spurious emission supplied to the transmission line must be 40 dB. below the mean power of the fundamental without exceeding the power of 50 milliwatts. Note that this applies to the input to the transmission line, not to the aerial. In some circumstances the A.B.C.B. may require far lower spurious radiation

We have stated already that harmonics radiated from aerial systems can cause harmful interference to other services. Let us take an example. Assume that two transmitting stations are close to each other, and that the general location is close to a busy capital city port. Let these hypothetical stations operate on 912.5 KHz. and 1315 KHz.

These frequencies have been chosen to avoid embarrassment to any Australian stations as none operate on them. Also, let us assume that the first station has a measured field strength at one mile of 1 mV./m. at the second harmonic. Some calculations produce a disturbing result, so let us do these calculations.

Station A:
Fundamental frequency, 912.5 KHz.
Second harmonic (912.5 × 2), 1825.0 KHz.

Station B:
Fundamental frequency, 1325 KHz.

Now there will be two new frequencies produced by the second harmonic of A and the fundamental of B, and these can be detected by receivers tuned to each of them over a distance of possibly 15 to 20 miles. These new frequencies have been produced through the phenomenon known as Beats.

These new frequencies will be the sum and difference frequency between the second harmonic of A and the fundamental of B, and will be 3150 KHz. and 500 KHz. respectively.

This latter is the International Distress Frequency and in the circumstances outlined, considerable interference could occur to distress calls. In this case the Administration would require station A to reduce its second harmonic to a level where there would not be interference on 500 KHz.

From all this, it can be seen that radio frequency harmonics generated in a transmitter, then radiated either directly from the transmitter itself, from the transmission line, or the aerial, can cause serious interference to other services, so they are unwelcome signals.

Secondly, during the process of applying audio frequencies to a transmitter, known as modulation, it is quite possible that additional audio frequency harmonics will be generated and these will show up as distortion of the original audio frequency wave forms. If the amplitude of these is great enough the resulting transmission will be harsh and not a faithful reproduction of the original signals.

There are two fundamental types of modulation, known as Amplitude Modulation and Angle Modulation.

Amplitude modulation is a process in which the amplitude of a transmitter's carrier wave is varied by the impressed audio frequency wave. There are several methods of achieving this.

Angle modulation is a process in which the phase angle of the carrier is varied by the impressed audio frequency wave.

Phase Modulation and Frequency Modulation are particular forms of Angle Modulation.

WHY ARE HARMONICS GENERATED?

Now let us ask ourselves a question, then answer it.

In an electronic audio or radio frequency system why are harmonics generated? Answer: Because the system is not linear.

Let us take a look at the reason for this. If we set up a vacuum type rectifier valve and apply increasing voltage between the anode and cathode we can measure the current flow through the valve with an ammeter connected in series in the circuit, and on squared graph paper we can plot a curve showing the relationship between impressed voltage and current flow.

It will be found that at low voltages the curve is not a straight line, then as the voltage is increased the line will become virtually straight, however at some high voltage the line will again depart from its straight form to become curved. This is where the cathode runs out of emission. (The valve may flashover before this point is reached.) This is the elongated S of Fig. 1a. The general shape of the curve is the same for all high vacuum rectifiers although the slope may differ between different valve types. All of these remarks apply to a half-wave rectifier, and after all a full wave vacuum tube rectifier consists of two half-wave rectifiers in the same envelope.

An examination of this curve reveals that there is a linear relationship between applied voltage and the current passed over most of the curve, but at both ends there is a marked departure from the linear condition.

This curve is, also, a generalised curve for a valve amplifier valve having sufficient bias to cut-off the plate current, and which runs out of cathode emission at the other end of its curve.

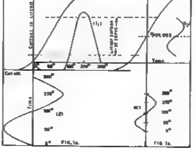


FIG. 1a. FIG. 1b.

As an example, we may take the case of a class C stage of a plate modulated telephony transmitter. The class C amplifier operates with a very high grid bias, several times that needed for plate current cut-off. The a.c modulating voltage adds or subtracts to the d.c. plate voltage so that at 100% positive modulation the peak plate voltage is double the d.c. plate voltage, whereas on the negative swing of the modulating voltage this subtracts from the d.c. plate voltage with the result that at this point it exactly cancels the d.c. plate voltage.

If the class C amplifier stage has been properly set-up, and an analysis is made of the resultant modulated wave at 100% modulation with, say, an audio frequency of 1,000 Hz., then it will be observed that the wave is symmetrical, that is both positive and negative sides (peaks) are the same. This measurement can be done best when a sine wave is used for modulation, with a cathode-ray oscilloscope, or with an amplitude modulation monitor.

However, after some considerable time, it may be found that the positive and negative peaks are no longer the same, that is the wave is not symmetrical, also that there is serious harmonic distortion.

Although the d.c. plate current is still the same, assuming that there has not been any change in the adjustment of the transmitter, then it will be found that whilst the negative half of the modulating voltage can take the class C amplifier to 100% negative modulation, the positive modulating voltage cannot raise the amplifier to 100% positive modulation.

What has happened is that the class C amplifier valve has started to lose cathode emission and the loss can only be detected when the plate voltage is swung high in a positive direction by the modulating voltage. The class C stage valve is then operating in the top curved position of the curve in Fig. 1a.

It is only proper to state that this is the loss of peak cathode emission. If the valve or valves causing the asymmetrical modulation are left in use the emission will drop to the stage where it becomes apparent due to lower than normal d.c. plate current.

It may not be clear from the diagram in Fig. 1a that the elongated S current is derived by applying various d.c. voltages to the valve.

If an a.c. voltage is applied then no part of the curve can be completely straight simply because there are no two successive points in a sine wave which make a straight line. Theoretically this can be taken to two consecutive electrons and is due to the fact that the angle of the current is continuously changing, whether we consider this change in single degrees, or say one millionth of a degree.

The sine curve of Fig. 1a when projected via the elongated S current curve produces the current curve I1 of Fig 1a.

The student should draw these curves to satisfy himself

In Fig. 1a we have shown, too, a sine wave whose axis passes through

the current curve slightly to the right of the cut-off point. By extending the sine wave curve upwards, to where it intersects the current wave we can plot a graph or curve of the current which flows in the valve due to the excitation by the sine wave. As this wave proceeds from 0° to 45° in a negative direction the valve is driven to the cut-off point then past this position so no current can flow in the circuit.

It will be noticed that a small amount of current will flow between 0° and approximately 45° since the cut-off point corresponds to approximately 45°.

From 45° to 90° the valve is driven past cut-off so no current can flow.

After 90° the exciting voltage starts to drop to zero at 180°. However when it reaches 135° it has come back to the cut-off point, so that from 135° to 180° a small amount of current may flow. It must be remembered that although the exciting wave is now in a conducting portion of the valve curve, the exciting voltage is, itself, falling to zero until at 180° there is no exciting voltage, hence no current.

As the exciting voltage (e) increases in a positive direction from 180° to 270°, the valve will conduct so that current flows in the valve.

This is shown in curve (I1) Fig. 1a.

But it will be seen that as the exciting wave approaches 270° the current (I1) does not increase in proportion and (I1) does not regain its shape until after the exciting voltage has passed 270°.

Curve (I1) between the lines marked "linear portion of curve" appears to be a straight line on each side and can be considered linear, but the parts outside the linear portions are curved and it is operation in these regions that produce harmonics.

It will be noted, too, that the curve (I1) is far from the same shape as the exciting voltage curve (e), in fact it is approximately only half of it.

This is the type of curve we get when a rectifier valve changes a.c. into d.c., when an amplifier, whether audio or radio frequency distorts or when a frequency multiplier is used in a transmitter to produce high frequency from a lower one by harmonic multiplication.

Now let us look at Fig. 1b. The elongated S curve is the same as that of Fig. 1a (as near as we could draw it and means exactly the same). **But** this curve is taken to represent an amplifier valve, not a rectifier.

An amount of negative bias has been applied to the grid of the valve so that its operating point is half way along the linear portion of the curve.

Now if an a.c. exciting voltage (E) is applied and its maximum negative and positive peaks do not pass beyond the limits of the linear portion of the curve, then the resultant curve (I2) will have an identical shape to the shape of the exciting voltage (E). Its amplitude may be greater or lesser depending on whether the valve has a gain greater than unity, but the shape will be similar, i.e. if (E) is a sine-wave, then (I2) will be a sine-wave.

Now, if the exciting voltage E is increased in amplitude its negative and positive peaks will exceed the linear portion of the current curve and (I2) will no longer be a sine-wave as its negative and positive peaks will be flattened as shown in the half cycle (I1) of Fig. 1a. Distortion will result as harmonics will be produced.

Also, if instead of altering the amplitude of the exciting voltage (E), the bias points (new axis) is moved, then again the resultant wave will not be symmetrical.

Notice should be taken in Fig. 1a and 1b that although the current curve is the same in both, amplitude of the exciting voltage (E) has been reduced to make it fit the linear portion of the current curve.

The student should draw these curves, also draw a larger sine-wave (E) and plot this when he will find that the peaks of the plotted current curve are flattened as has been stated.

To show how harmonics distort a pure sine-wave, Figs. 2 and 3 should be examined. In Fig. 2 the single cycle represents a sine-wave. Superimposed on this is a smaller amplitude wave of two cycles, this being the second harmonic of the sine-wave. Actually this is a co-sine-wave, that is one which reaches its maximum value 90 electrical degrees before a sine-wave would do so. However, it is important to realise that in Fig. 2 there are two cycles of the co-sine-wave and only one cycle of the sine-wave. A single cycle co-sine-wave would be shown starting with maximum current of 0°.

> ● The frequencies of all the stations mentioned in this lecture were as stated at the time the lecture was written. However, with the passage of time, some station frequencies may change, therefore any Amateur wishing to calibrate equipment by using b.c. stations as frequency references should verify the frequency of each station beforehand. A list of stations may be obtained from the Australian Broadcasting Control Board, 373 Elizabeth Street, Melbourne, Vic., 300.

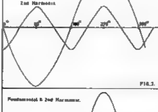


FIG.3.

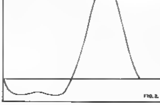


FIG.2.

In order to illustrate the effect of a second harmonic on its fundamental (1st harmonic) the maximum amplitude of the second harmonic has been made about 37% of the fundamental, this being the most that could be drawn in the space available.

A second harmonic of this magnitude will greatly modify the fundamental and normally such a harmonic would not be found in any form of electrical reproduction unless the equipment is badly out of order. This statement does not apply to transmitters where frequency multiplication is used. Also, it does not apply to musical instruments (as already shown) including those using electrically generated tones.

The manner in which the second harmonic modifies the fundamental may be found by adding, algebrically, the amplitudes of the fundamental and the second harmonic at any given time (electrical degree), remembering that those parts of the curves above the axis are positive and those below are negative.

It will be observed that at 90° the maximum positive portion of the first cycle of the second harmonic will subtract from the maximum of the fundamental so that the amplitude of the latter is greatly reduced. However, the maximum positive portion of the second cycle of the harmonic adds to the maximum positive portion of the fundamental, thus increasing it.

This means that the original sine-wave of Fig. 2 is no longer symmetrical, hence it is distorted.

The curves of Fig. 2 have been added together and produce the curve shown in Fig. 3. Note that the negative portion of the sine-wave of Fig. 2 has been greatly reduced in amplitude and that it has been grossly flattened. On the other hand, the amplitude of the positive half has been increased considerably, although its base line is the same, and its shape has changed a little too.

So this is what happens to a wave having a large second harmonic.

Actually its general shape in the positive direction closely resembles that of the current wave I1 of Fig. 1 (the drawing scales are not the same) and this proves what we set out to prove, namely, that a rectifier can produce considerable harmonic distortion, as can a valve rectifier which is either wrongly biased or has too great an exciting voltage on its grid

For simplicity, Figs. 2 and 3 do not show other harmonics, but the student can add these. For instance, three cycles of 3rd harmonic can be drawn in Fig. 2. The first cycle can start in a positive direction at 0° with maximum at 30°, maximum negative will be at 90° and so on. Again for simplicity this could be made, say 10° of the fundamental. Then Fig. 3 can be replotted using the figures or dimensions obtained by adding together the fundamental, 2nd and 3rd harmonics when it will be seen that there are more changes in the overall shape of Fig. 3.

It is rather difficult to draw, graphically, and specially at low levels, any further harmonics.

(to be continued)

John Moyle Memorial National Field Day Contest, 1971

SATURDAY, 13th FEBRUARY, TO SUNDAY, 14th FEBRUARY, 1971

The Federal Contest Committee of the Wireless Institute of Australia invites all Australian Amateurs and Short Wave Listeners to participate in this Annual Contest, which is held to perpetuate the memory of John Moyle, whose efforts advanced the Amateur Radio Service.

There are two divisions of this Contest, one of 24 hours continuous duration, and one of 6 hours continuous duration. The six-hour period has been included to encourage the operator who is unable to participate for the full 24-hour period. The 24-hour continuous operation is to be chosen by operator from 26-hour period.

Operators using 25 watts or less input to the final stage will be considered for a certificate where his activity warrants its issue.

DATE

From 0600 GMT, 13th February, 1971, to 0800 GMT, 14th February, 1971.

OBJECTS

The operators of Portable and Mobile Stations within all VK Call Areas will endeavour to contact other Portable/Mobile and Fixed Stations in VK Call Areas and Foreign Call Areas.

RULES

1. There are two divisions, one of six (6) hours, and one of twenty-four (24) hours duration. The six-hour period for operating may be chosen from any time during the Contest, but the six-hour period so chosen **must be continuous.** In each division, there are six sections:—

   (a) Portable/Mobile Transmitting, Phone.
   (b) Portable/Mobile Transmitting, C.w.
   (c) Portable/Mobile Transmitting, Open.
   (d) Portable/Mobile Transmitting, Multiple Operation, open only.
   (e) Fixed Transmitting Stations working Portable/Mobile Stations, open only.
   (f) Reception of Portable/Mobile Stations.

2. All Australian Amateurs are encouraged to take part. Operators will be limited to their licensed power. For Portable entries, power shall be derived from a self-contained and fully portable source.

(a) Portable/Mobile Stations shall not be situated in any occupied dwelling or building. Portable/Mobile Stations may be moved from place to place during the Contest.

No apparatus shall be set up on the site earlier than 24 hours prior to the Contest.

All Amateur bands may be used, but no cross band operating is permitted. Cross mode operation is permitted.

Entrants in Section (d) for Multiple Operator Stations can set up separate transmitters to work on different bands at the same time. All such units of a Multiple Operator Station must be located within an area that can be encompassed by a circle not greater than half a mile diameter.

For each transmitter of a Multiple Operator Station a separate log shall be kept with serial numbers starting from 001, and increasing by one for each successive contact. All logs of a Multiple Operator Station shall be submitted by the operator under whose Call Sign the transmitters are working. No two transmitters of a Multiple Operator Station are permitted to operate on the same band at any time.

3. Amateurs may enter for any section.

4. One contact per station for phone to phone, also one for c.w. to c.w. per band is permitted. Cross mode operation will be accepted for scoring.

5. Entrants must operate within the terms of their licences and in particular observe the regulations with regards to portable operation.

6. For VK stations contacting VK stations, the exchange of serial numbers consisting of RS or RST report plus three figures commencing with 001 and increasing by one for each successive contact by the VK station shall be proof of contact. **The exchange of RS or RST reports only with non-VK stations shall be sufficient proof of contact for this contest.**

7. **Scoring—**

(a) **Portable/Mobile Stations:**

For contacts with Portable/Mobile Stations outside entrant's Call Area .... **15 points**

For contacts with Portable/Mobile Stations within entrant's Call Area .. .. **10 points**

For contacts with Fixed Stations outside the entrant's Call Area .... **5 points**

For contacts with Fixed Stations within the entrant's Call Area .... **2 points**

(b) **Fixed Stations:**

For contacts with Portable/Mobile Statons outside entrant's Call Area .... **15 points**

For contacts with Portable/Mobile Stations within entrant's Call Area .... **10 points**

Operation via active repeaters or translators is not allowed for scoring purposes.

Example of Victorian S.w.l's Log

Date Time (GMT)	Band (mx)	Call Sign Heard	RST No. Sent	Station Worked	Pts Clm.
13/2/71 0600 GMT	80	VK2AAH/P	59001	VK3ATL/P	15
0610	80	VK3ATL/P	59006	VK3QV	10
0620	40	VK2AAH/P	599004	VK6VF/P	15
640	20	VK3QV	59010	VK5QX/P	*
0900	20	VK4OF/P	59040	VK4OX/P	15

* No claim Fixed Station.

8. The following shall constitute Call Areas: VK1, VK2, VK3, VK4, VK5, VK6, VK7, VK8, VK9 and VK0.

9. All logs shall be set out under the following headings: Date/Time (G.M.T.), Band, Emission, Call Sign, RST/No. Sent, RST/No. Received, Points Claimed. Contacts must be listed in numerical order.

In addition, there shall be a front sheet showing the following information:—

Name . . ..Address . .
Call Sign.............. .. Section .. .. .
Division ....(6-hour or 24-hour)
Points Claimed ....
Call Sign of other op./s (if any) ...
Location of Portable/Mobile Station . .
From .... hours to .... hours

A brief description of equipment used, and points claimed, followed by the declaration:

"I hereby certify that I have operated in accordance with the rules and spirit of the Contest."

Signed Date ......

10. The right is reserved to disqualify any entrant who, during the Contest, has not observed the Regulations and the Rules of this Contest, or who has consistently departed from the accepted code of operating ethics.

11. The decision of the Federal Contest Manager of the Wireless Institute of Australia is final and no disputes will be entered into.

12. Certificates will be awarded to the highest scorer of each section of each division. Additional certificates may be issued at the discretion of the F.C.C. The six-hour certificates cannot be won by a 24-hour entrant.

13. **Return of Logs:**

All entries must be postmarked not later than **7th March, 1971,** and be clearly marked "**John Moyle Memorial National Field Day Contest, 1971**" and addressed to:

Federal Contest Manager, W.I.A.,
Box N1002, G.P.O.,
Perth, W.A., 6001.

RECEIVING SECTION

14. This section is open to all Short Wave Listeners in VK Call Areas. The Rules shall be the same as for the Transmitting Stations, but may omit the serial numbers received.

Logs must show the Call Sign of the Portable/Mobile Station heard, the serial number sent by it, and the Call Sign of the Station being worked.

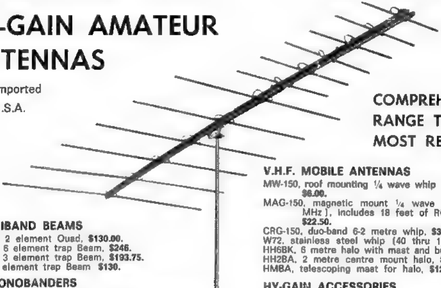
Scoring will be on the same basis as for Transmitting Stations. It will not be sufficient to log a station calling CQ. A portable/mobile station may be logged once only for phone and once only for c.w. in each band.

Awards: Certificates will be awarded for the Highest Scorer in each Call Area, for the 6-hour and the 24-hour divisions.

Season's Greetings to all Readers

HY-GAIN AMATEUR ANTENNAS

Fully Imported from U.S.A.



COMPREHENSIVE RANGE TO SUIT MOST REQUIREMENTS

H.F. TRIBAND BEAMS

Hy-Quad, 2 element Quad, **$130.00.**
TH6DXX, 6 element trap Beam, **$246.**
TH3Mk3, 3 element trap Beam, **$193.75.**
TH3Jr, 3 element trap Beam **$130.**

H.F. MONOBANDERS

204BA, 4 element 20m Beam, **$190.**
203BA, 3 element 20m. Beam, **$150.**
153BA, 3 element 15m Beam, **$94.**

H.F. VERTICALS

14AVQ, 10m thru 40m trap Vertical, **$59.**
18AVQ, 10m. thru 80m. trap Vertical, **$85.**
18V, 10m. thru 80m base loaded Vertical, **$36.50.**

H.F. MOBILE WHIPS AND FITTINGS

HMM, mobile mast assembly, **$19.50.**
MC Series coil and adjustable tip-rod assemblies.

MC-75, 80m., **$25.00**	MC-20, 20m., **$18.75**
MC-40, 40m., **$19.50**	MC-10, 10m., **$14.50**
MC-15, 15m., **$16.60**	

BPR, bumper mount, **$12.50.**
BDYF, body mount, **$9.00.**
SPG, heavy duty spring, **$12.50.**
SPGM light duty miniature spring, **$6.00.**
QD, quick disconnect accessory for mobile whips, **$6.00.**
JMS, "Jiffy" body mount, **$9.00.**
Also Body mount co-ax adaptors, gutter clips, whip fold-over adaptors.

V.H.F. ANTENNAS

23, 3 element 2m. Beam, **$15.**
28, 8 element 2m Beam, **$29.50.**
215, 15 element 2m Beam, **$59.**
SGP-2, 2m ground-plane, **$12.50.**
GPG-2, 2m 5/8 wave ground-plane, **$23.**
GP-50, 25 thru 54 MHz. ground-plane, **$25.**

V.H.F. MOBILE ANTENNAS

MW-150, roof mounting 1/4 wave whip (108 thru 470 MHz.), **$6.00.**
MAG-150, magnetic mount 1/4 wave whip (108 thru 450 MHz.), includes 18 feet of RG58U and connector, **$22.50.**
CRG-150, duo-band 6-2 metre whip, **$38.00.**
W72, stainless steel whip (40 thru 100 MHz.), **$15.75.**
HH6BK, 6 metre halo with mast and bumper mount, **$34.50.**
HH2BA, 2 metre centre mount halo, **$12.50.**
HMBA, telescoping mast for halo, **$12.50.**

HY-GAIN ACCESSORIES

BN-86, broad-band ferrite Balun, for beams and doublets, **$22.**
LA-1, Lighting Arrestor, for installation in standard 52 or 72 co-axial feedline, designed to Mil. specs., **$37.**
EI, End Insulators, for doublets, **$2** per pair.
CI, Centre Insulator, for doublets, **$7.50.**

OTHER ACCESSORIES

Digital Electric Clocks.
"Solari" (Italian), 24-hour, large figures, **$29.00.**
"Caslon" (Japanese), 12- and 24-hour, **$24.50.**
EK-26, Katsumi Electronic Keyer, **$75.00.**
K-109, Kyoritsu dual impedance 52 and 75 ohm SWR meter, **$21.00.**
PS-750, PIC single-pole, 5-position co-axial line RF switch, **$21.50.**
PS-751, PIC two-pole, 2-position co-axial line RF switch, **$16.50.**
PS-752, PIC single-pole, 2-position co-axial line RF switch, **$15.50.**
1100M Emotator heavy duty antenna rotator, base mount, **$148.50**; pipe mount, **$165.00.**
7-conductor cable, for rotator control, **60 cents/yd.**
PTT Microphones, Taylor (U.S.A.) Car Compasses and Altimeters.
Co-axial Cable and Connectors also available.

All Prices include Sales Tax. Freight is extra.
Prices and specs subject to change without notice
Immediate availability is dependent on stock position at time of order

BAIL ELECTRONIC SERVICES

60 SHANNON STREET, BOX HILL NORTH, VIC., 3129. Telephone 89-2213

N.S.W. Rep.: **STEPHEN KUHL, P.O. Box 56, Mascot, N.S.W., 2020.** Telephone Day 67-1650 (AH 37-5445)
South Aust. Rep.: **FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000.** Telephone 23-1268
Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379

INDEX OF "A.R." TECHNICAL ARTICLES—1966-1970

ANTENNAE, ETC.

AUDIO FREQUENCY EQUIPMENT

INDEX OF TECHNICAL ARTICLES

● Have you ever been looking for a technical article and could not recall what year it appeared? Just remember that "A.R." has published a five-year Index of Technical Articles each December for the years 1955, 1960, 1965 and now herewith 1970.

HINTS AND KINKS

INSTRUMENTS

MISCELLANEOUS

POWER SUPPLIES

RECEIVING

☆

RACAL WINS FAIRCHILD PLANAR AWARD WITH NEW POWER AMPLIFIER

The 1970 Fairchild Planar Award, presented annually for practical application of semiconductors in a unique concept or design, has been won by Racal (Aust.) Pty. Ltd., who entered a power amplifier which is used in their range of high quality, high frequency s.s.b. transceivers.

The award, a bronze plaque featuring an engraved micro-circuit design, was presented to Mr. John Jackson, Chief Engineer of Racal, by Mr. John Baldwin, General Manager of Fairchild (Aust.) Pty. Ltd., at a function at the Wentworth Hotel, Sydney, on November 11, 1970.

"We believe that this amplifier was the first commercially available fully solid state 100 watt linear high frequency amplifier in the world," said Mr. Jackson, accepting the award.

Transceivers incorporating the new technology are now exported worldwide. They are also used extensively in Australia, particularly for post office out-back radio stations.

Presenting the award, Mr. Baldwin said, "The enterprise shown by Racal engineers in designing and developing this range of transceivers, and in winning the Planar Award, is just further evidence of the potential we have in Australia. When we tackle challenges in the right way, we take our place among the world's leading technological nations."

A & R-SOANAR GROUP APPOINTMENT

Mr. Barry T. Houston has joined the A & R-Soanar Electronics Group, Box Hill, Vic., as a transformer design and development engineer, where he will be engaged on forward research and development activities

Formerly Mr. Houston was a design engineer with L. M. Ericsson Pty. Ltd., Trimax Division, and Thorn Electrical Industries Pty. Ltd.

INCREASE IN AMATEUR LICENCE FEES

Following the increase of Amateur licence fees from $2 per annum to $6 per annum announced in the last Budget, the following telegram was sent by the Institute to the Postmaster-General

"The Wireless Institute of Australia refers to the Wireless Telegraphy Regulations Bill and asks that licence fees increase to $6 be reviewed. Our request is justified on the following grounds—

1. The Amateur Service deserves special consideration because of community interests served in disasters.
2. The Amateur Service educates and encourages technical expertise
3. Amateurs have no recourse to claim licence fees as a tax deduction.
4. The Wireless Institute is the only organisation representing a licensed communication service. By co-ordinating individual requests and with active self-policing committees, your Department's costs associated with the administration and technical supervision are minimal.

We urge favourable reconsideration of the proposed licence fee increase."

"As addendum to previous lettergram, many Amateur licensees are pensioners and should be accorded similar concessions to those they presently enjoy as holders of broadcast and television viewers' licences."

—Peter D Williams, VK3IZ,
Federal Secretary.

The following is the Postmaster-General's reply to the Institute:

Postmaster-General,
Canberra, A.C.T., 2600

Dear Mr. Williams,

I refer to your lettergram of 8th October, 1970, concerning the proposed increase in licence fees for amateur radio stations.

The existing licence fee for all types of radio-communication stations has remained unchanged at $2 per annum since 1924. In the years before 1950 when stations were few in number and primarily provided a medium for emergency communication (ships, aircraft and police) revenue did not match costs, but the difference was not great enough to cause concern. Since 1950, however, developments in techniques have been such as to permit a large scale expansion in the use of radio communication in the commercial and other fields. There are now more than 135,000 licensed stations of a variety of types operating under diversified rules designed to maintain the orderly development and conduct of services generally. At the same time the disparity between licence fee revenue and costs has continued to increase to a point where it was essential to introduce measures to remedy the situation. It must also be kept in mind that money values have changed so that the fee of $2 which has applied since 1924 is the equivalent of $7 today

There have been developments in amateur radio corresponding to those referred to above. In 1924, for instance, there were only 335 licensed amateur transmitting stations using quite limited operating techniques. The number has now grown to 6,338, comprising stations using a far greater range of techniques than in earlier years. Today, amateur licensees are authorised to pursue experiments in the V.H.F, U.H.F and S.H.F bands, to undertake television experiments and to employ single sideband and pulse transmissions. Amateur licensees, as you know, also now engage in experiments involving moon reflected signals and communication satellites.

In determining the new fee structure, which will apply to all radio services, account was taken of the fact that the costs associated with the licensing and surveillance of land and fixed stations are greater than those associated with stations in the mobile category and, as you probably are aware, the fee for the former will be $10 and for the latter $6 per annum.

Although the large majority of amateur stations more appropriately belong to the fixed category it was decided that their confinement to experimental and non-commercial activities warranted special consideration and that they should be included in the $6 category.

Although it is appreciated that the amateur service is self regulated to a large degree, my Department is required, in return for this $6 fee, to grant licences, issue and record call signs, inspect stations, investigate complaints, arrange for reciprocal agreements with other countries, frequency measure and monitor transmissions as required and liaise with other Administrations and the International Telecommunication Union in regard to amateur radio matters generally.

I can assure you that I am well aware of the part which amateur radio operators have played and are continuing to play in providing emergency communications during national emergencies. I also appreciate the encouragement given to the study of the radio art through amateur radio activities. At the same time I regret to advise that the Government cannot continue to subsidise the administration of amateur radio stations to the extent that it has done over recent years and that the way is not clear, therefore, to reduce the new fee of $6.

The increased fees for licences will still not meet the discrepancy between revenue and costs and for this reason I am afraid it would not be possible to introduce concession fees for pensioner amateur station licensees, as requested. As you will appreciate, the grant of such a concession would make it most difficult to reject claims by other amateur operators who may consider their situation warrants a similar concession.

Yours sincerely,
Alan S. Hulme,
Postmaster-General.

☆

NEW CALL SIGNS

JULY 1970

VK1BS—B. A. Stevens, 28 Adair St., Scullin, 2614.
VK2AIL—D. E. Law, 10 Bunarba Rd., Gymea, 2227.
VK2AOW—R. J. Wirth, 22 Berry St., Cronulla, 2230.
VK2AQD—J. J. Clarke, 478 Lane Lane, Broken Hill, 2880.
VK2BIC—D. H. Watkins, 63 Beatrice St., Balgowlah Heights, 2093.
VK2BMB—R. A. Balch, 24 Dress Circle Rd., Avalon, 2107
VK2BRN—J. Wippo, 28 Judge St., Randwick, 2031.
VK2ZIL—K. J. Hargreaves, 186 Marks Pt. Rd., Marks Point, 2280.
VK2ZKM—G. L. May, 24 Walsh Ave., Maroubra, 2035.
VK2ZPV—P. S. Vogel, 5 Wilson St., Maroubra, 2035.
VK2ZQH—P. J. Chappell, 4 Gallop Ave., Parkes, 2870.
VK2ZWC—W. C. Coates, 66 Ferrier St., Lockhart, 2656.
VK3GM/T—T G. Foster, 802 Sebastopol St., Ballarat, 3350.
VK3JE—J Bays, Station: 3 Allison Rd., Mount Eliza, 3930; Postal P.O. Box 314, Clayton, 3168.
VK3VU—L. Cunnington, 4 Eustace St., Wendouree, 3355.
VK3AEZ—J. McL. Vale, 965 Mt. Alexander Rd., Essendon, 3040.
VK3AQT—J. H. L. Field, 27 Reigate Rd., Highton, 3216.
VK3BAO—R. J. Malcolm, Boisdale, 3860.
VK3BDQ—J. K. Horan, 34 Roberts St., Glen Waverley, 3150.
VK3BDU—H. H. E. Westerhof, Army Apprentice School, Balcombe, 3935.
VK4FV F. W Fowler, 10 Orestes Rd., Yeronga, 4104.
VK4HQ—L. P. Crowe, 4 Orvieto Tce., Caloundra, 4551
VK4KI—R. K. Rutherford, 7 White St., Nerang, 4211.

VK4VA—V F Burman, 4 Mays Crt., Aitkenvale, 4214.
VK4XF—J F Russell, Station Raintree Ave., Victoria Estate, 4850, Postal C/o. P.O., Victoria Estate, 4850.
VK4YA—G. T. Adamson, 3 Maker St., Toowoomba, 4350
VK4YL—R. V. Bulman, 4/82 Apollo Rd., Bulimba, 4171.
VK4YV—V. M. Rhys-Williams, Station: Little Ships Club, Dunwich, 4183, Postal C/o. Post Office, Dunwich, 4183.
VK4ZAI—R. A. Isaac, 112 Auckland St., Gladstone, 4680
VK4ZLR—A. R. Langmead, 38 Morrow Rd., Taringa, 4066.
VK4ZMJ M. J Joyce, 25 Prout St., Camp Hill, 4152.
VK5EN/T—A. R. E. Nitschke, 3 Hall St., Cummins, 5631
VK5VP—E. J. V. Willis, 5/394 Glynburn Rd., Kensington Gardens, 5068.
VK5VT/T—N. S. Schahinger, 77 The Grove, Lower Mitcham, 5062.
VK5ZDM—P. R. Messer, 15 Brigalow Ave., Blackwood, 5051.
VK5ZFC—D. A Gassner, 59 Russell Tce., Woodville Park, 5011.
VK5ZIG—G. W. Douglas, 133 Flinders Tce., Port Augusta, 5700.
VK5ZPA—P. A. Reichelt, 35 Gray St., Kilkenny, 5009.
VK6BQ—R. R. Davies, Falls Rd., Lesmurdie, 6076.
VK6ML/T—Technical College Radio Club, Harold St., Mt. Lawley, 6050.
VK6VE—The Southern Electronics Group, Blue Waters, Little Grove, Albany, 6330.
VK6CIE—F. W. Fletcher, Station: Portable; Postal: 53 Ives Park, Ringwood, England.
VK6ZAJ—G. Drage, 1/409 Cambridge St., Floreat Park, 6014.
VK7ZGD—G. de Groot, C/o. Hytten Hall, University of Tasmania, Sandy Bay, 7005.
VK8CW—C. F Williams, 34 Memorial Dr., Alice Springs, 5750.
VK8ZFH—G. L. Stephens, 8/1377 Sergisons Crt., Rapid Creek, 5792.

CANCELLATIONS

VK1BA—R. J Mirdas Not renewed.
VK1DD—D. R. L. Davies. Not renewed.
VK1VB—V. F Burman Now VK4VA.
VK1ZAV—D R Avdall Not renewed
VK1ZJH—J Hyne. Transferred to Vic.
VK1ZRN—R W. Nash. Now VK3ZRL.

VK2BA—B. A. Chapman. Deceased.
VK2OG—G. J. Menon. Deceased.
VK2QK—A. L. Manwaring. Deceased.
VK2ZS—W J Smith. Transferred to W.A.
VK2ZW—S. U Grimmett. Not renewed.
VK2AQL—L. J. Lee. Deceased
VK2AQR—R. W. Rose. Deceased.
VK2ARN—W. H. R Stitt. Not renewed.
VK2ARQ—A. A. Rayner. Deceased.
VK2BAD—A. Davis. Transferred to A.C.T.
VK2BAW—G. F. Viertelhausen. Not renewed
VK2BBS—B A. Stevens. Now VK1BS.
VK2BFO—B. E. Cloudesley. Not renewed
VK2ZBR—B. H. Ridley Not renewed.
VK2ZDE—R. A Day. Not renewed.
VK2ZDR—D. G. Hoskins. Not renewed.
VK2ZGC—J J. Clarke. Now VK2AQD.
VK2ZNI—P. T. Nicholson. Not renewed.
VK2ZQA—R. J. Irving. Not renewed.
VK2ZQI—P R. Lorentzen. Not renewed.

VK3LW—L. McD. Stone. Transferred to N.S.W.
VK3VE—V. W Harrison. Not renewed.
VK3YG—G. E. Smith. Transferred to A.C.T.
VK3ANA—P. W. Collee Not renewed.
VK3ASG—J W Brown Not renewed.
VK3AVZ—G A. Trotter. Transferred to N S W.
VK3AZH—K. J Horsfall. Not renewed.
VK3YAR—R. J Malcolm Now VK3BAO
VK3YBE/T—T. G. Foster Now VK3GM/T

VK4LU—P H Long. Transferred to W.A
VK4PL—W C. Proposch. Deceased.
VK4RM R E. McDermott Not renewed.
VK4VP E. J. V Willis Now VK5VP
VK4ZKB—K E. Ballantyne. Not renewed.
VK4ZLO—L. A. Davies. Transferred to N S.W
VK4ZTA—G. T Adamson Now VK4YA.

VK5BV B. A. Wheeler. Transferred to W.A.
VK5GT R. J. Chamberlain Not renewed.
VK5OJ B. G. Daw. Deceased.
VK5SO—C. F Williams. Now VK8CW
VK5XW C P Shields. Deceased
VK5ZG—L. A France. Not renewed
VK5ZAL—A. L. Purnell. Not renewed.
VK5ZAS/T N. S. Schahinger Now VK5VT/T.
VK5ZDO—R. J. Watson Not renewed
VK5ZFH C. L. Stephens Now VK8ZFH
VK5ZZI—D. W Friend Transferred to N.S.W.
VK5ZZZ—P C Drewer Not renewed.

VK6AQ—G R Crews. Not renewed.

VK7KG—K. F Gosling. Transferred to N.S.W.
VK7RL—R. V Bulman. Now VK4YL.

VK8ZBA—J A. Cooper Now VK8JC.

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

Increased postal charges are normally not to be associated with DX news as such, however they are of vital importance to the DX man, particularly the one who has a large volume of outward QSLs. The increased cost of overseas surface mail to foreign countries by two cents to nine cents, and by a similar amount for Commonwealth countries to seven cents, was bad enough, but have you noticed tucked away in the centre of the new charges book, the slug on I.R.Cs.? They have jumped from what was a pretty steep cost up to 10 cents for I.R.C. and 7 cents for British Commonwealth Coupons

There is little we can do about having this situation remedied, however there are some alternatives, firstly keep an eye on the DX news sheets for cut-price coupons, secondly make sure your coupons, which may come in from overseas, are not exchanged at the Post Office for a 9c stamp, but passed on to some DX man for the same cost, or do the obvious and buy them out of this country where they are cheaper. This would apply to the operator who uses a lot of them. Or stick to the bureau.

News is scarce again this month, owing to some of the news sheets not coming in. However, I have had a fair response from our own chaps so I guess we will get by this time. From prominent VK5 listener, Steve Ruediger, comes a very welcome tape with loads of DX on it. Some of the prefixes to grace this tape were OX3, EP2, FR7, CT2, MP4, JW7, ON5, UJ8, JW, ZL/C, GB3, CN8, GC2, PZ1, VQ9, OH8, HK0, FR7/G and many others

Jack AX3AXQ, down in Tatura, is still active on 14 s.s.b., worked amongst others, VR6LT, UA1KAE, ZL3VI on Chatham Is., AX9NI on Norfolk Is., JA5BLZ/MM, LX3CQ, OE5MAG, DL0OS, CT1PN and EA6BN, whilst a lot of good DX was heard. Thanks Jack for the QSL info, which will be listed with this month's list

Letter to hand from John ZL1AH via Peter Nesbitt with information on the Bay of Plenty Award, and enclosing a sample of the certificate Comparable to some of those beautiful colour certificates which Jock ZL3GX goes to so much trouble to get this one shows a full colour view of the area in plenty of detail. To get it stations other than ZLs need to work five stations in the Bay of Plenty region, that is Opotiki, Rotorua, Tauranga and Whakatane counties and boroughs within these counties. Mobile stations also qualify The five stations can be worked on any bands and you need check list showing station worked, date and band plus 50c or eight IRCs (QSLs are not needed) The applications should go to John Wightman, ZL1AH, Welcome Bay RD5, Tauranga, N.Z.

Of interest to the top band gang is the latest screed from Stew W1BB. Firstly, the annual Trans-Pacific tests will be held on the following dates: Dec. 5 and 19, Jan. 2 and 16, Feb 6 and 20. Times are 1330-1600z Saturdays, frequencies are 1807.5 to 1812.5 for JAs, 1807-2000 for W/VE West, 1800-1810 for W/VE East, ZLs will be on 1876, and VKs on 1802-1805 KHz. Call will be CQ DX Test in five-minute periods, listening between calls with the W/VE stations leading off On the same dates the JA to sunset tests will be held, but at 0730 to 1000z Sats. The JA to Europe tests are also on the same dates between 2030 and 2300z.

Whilst on the subject of top band, we have the A.R.R.L. 160 metre test coming up on 12th Dec 0001z to 13th Dec. at 1600z. Two points for each QSO with as many A.R.R.L. stations as possible and as many DX stations as possible, for which 5 points are given, plus multipliers for each A.R.R.L. section, one for VE8, and one covering all DX contacts. A total of 76 multipliers is possible. DX stations go for the highest score. Submit score-sheet, and alphabetical list of stations worked before 11th Jan. to A.R.R.L. Contest Committee, 225 Main St., Newington, Conn., 06111, U.S.A.

Of special interest may be the first ever contact made when Gene VP9GN made contact on 160 metres with K2ANR on Sept. 29 last. Evidently there has been some outstanding DX on this band as is evidenced in a report from S.w.l George Allen in VK5 to Stew W1BB, and published in his October bulletin. It would appear that quite a lot of good DX has been worked from VK to W land, and also heard out here, however in typical manner, I have to get these things secondhand from an overseas news-sheet.

On to regular DX news, once again we have had a new operation from Jordan, this time EP2HL/JY appeared. I don't know of anybody in this country working him, however if you have, and want a QSL, it should go to the French Embassy, Teheran. The actual operation was from Amman, Jordan.

The Ivory Coast is again in the news with an operation by Dan TU2CY, Box 821, Abidjan, Felix TU2BB, Box 296, Abidjan, and Jack TU-2CW, Box 1297, Abidjan. There have been reports of the latter in this country on 21 MHz.

The 5N5 prefix used by several Nigerian stations recently was a special one to commemorate the anniversary of the founding of the Republic 5N5AAF was one well to the fore, W7VRO being his QSL manager

Recent operation by AP2KS from East Pakistan was plagued with interference from all over the place but the contacts were maintained, and a successful job of control was done by I1IJ and 4S7PB QSL manager for this one was K3RLY International DX Assn., Box 125, Simpsonville, Maryland, 21150

The operation just completed from Lord Howe Is. by VK2APX (W6CR) and VK2BKM has two QSL managers, W6DI for the former, and W2CTN for the latter. Once again I have to rely on an overseas news-sheet for this information.

F6AXP/P currently active at the beginning of Nov. was QRV from Ile de Re, he asks for QSLs to Box 348, 63 Clermont-Ferrand, France.

Two stations are active from the Sth. Shetland Is., they are Rene CE8AT and CE8AZ. The former is on quite often on 14110 s.s.b. or thereabouts, and both stations QSL via CE3RR, Raoul Romero V., Box 13630, Santiago, Chile.

Two stations, signing GM3SVK/P and GM-3XTJ/P were active during the early part of October; on Oct. 10 from Stirlingshire, 11th from Aberdeenshire, 12th to 15th Shetland Is., 16th Clackmannanshire, and 17th from Roxburghshire. QSLs can go either direct to the home stations, or via the R.S.G.B.

OK5KVG, active from Oct. 1 to 7, from Ham meeting in Sth. Bohemia, is valid as prefix only. QSLs for him go to OK1AMU, J. Kubovec, Zvolenska 521, Prachatice

For the prefix hunters, still they come. DA is now being used by all foreign military stations in Germany. PJ8 and PJ9 were special prefixes used by W3HNK and W2KH resp. during part of Oct. 5N5 was used by some 5N2 operators during the last week in Sept. to Oct. 31. 9I6 was the expected prefix for 9J2 stations during the CQ contest to celebrate that country's 6th anniversary of independence PJ1AA used on Oct. 24-25 by Verona ARC for some undisclosed reason. QSL for this one to Box 383, Willemstad, Curacao, Neth. Antillies. Re the DA prefixes mentioned above, the call DA1RAF was used at the Gatow R.A.F. open day. QSL to G3XIN

KC6RK is on Palau Is. in the West Carolines, and asks for his cards to be sent via Robert J. Kennedy, U.S.C.T. Activities, Code 1, Box 70, F.P.O., San Francisco, Calif., 96637 KC6WS is also in the West Carolines, but on Yap Is.

An operation was due to take place from Oct. 18 to 25 by W3HNK and KV4EY under the calls PJ8AR, PJ8AR/FS7, VP2VY and possible under a VP2K call sign from St. Kitts. W3HNK will be handling the QSLs for all non-European stations, his address is Joseph L. Arcure, Jr., Box 14, Norwood, Pennsylvania, 19074, U.S.A.

5T5YL is once again active, and together with her OM 5T5AD has a sked with 4U1ITU daily at 0715z, and are looking for VK/ZL contacts via the long path.

Bert GC2LU is still to be worked from Jersey, and can often be located around 14160 s.s.b. between 0700 and 0800z. His new address is H. Chater, 100 Rouge Bouillion, St. Helier, Jersey

There has been a change in the QSL arrangements for CO2FA, formerly managed by XE-1AE, however that gentleman has logs to Sept. 1969 only, and suggests that all since that date go direct to the operator at Box 6096, Havana.

Some DX bulletins have reported incorrect info in respect to ZM3PO/C and ZM4OL/A. The latter is on Campbell Is. as is ZM4JF/A QSL information as shown in Nov "A.R." is correct.

A note from ZL DX Editor, and prominent QSL manager, George ZM2AFZ in which he tells me that he has received five cards for ZM1AAT/K which have neither call sign or address on them. Three of these are from VKs, the dates being Nov. 21, 1969, Dec. 24, 1969, and Jan. 30, 1970. Probably some absent minded user of the special Cook Bi-Centenary cards. If you think that yours may be one of the three, then a second completed card to George will do the trick.

The latest sunspot confirmation received by George was 131 for May, with the November prediction being 88. Twelve months ago it was 105. No wonder the bands are tending to flatten out somewhat. Yet they have their moments, over the contest week-end in Oct., 10 metres really came to life when countries like KR6, YB1, YV, XE, VR6, HC, PY, KZ5, KL7, UA, AP2, ZC4, DL, MP4, FB8, VP7, 6W8, EL2, OH, ZE, 4X4, UH8, CR7, CR5, ST2, 9G1 and many others were heard and worked both in VK and ZL. I cannot give a first hand report on 10, as my receiver is quite useless up there.

AWARDS

Asian DX Award.—Issued for working 30 Asian countries including JA since 30th July, 1962. G.C.R. list or QSLs plus 10 I.R.Cs to J.A.R.L. Awards Manager, Box 377, Tokyo Central, Japan. Any 30 countries from those listed by A.R.R.L. as Asian will count.

MANAGERS

These are once again taken direct from letters and logs, and are not in any specific order:

AC3PT—K2MME	FB8WW—F5QE
AX0KW—VK7KJ	WF7ARW—W7DK
DA1RS—WA3KFK	KJ6CD—W5TJT
HC2FN—WA2WUV	VP8JV—W3DJZ (new)
JD1ABO—JA1BA	ZD8BO—ZS2RM
VU2REG—VE3DLC	ZK1MA—KH6GLU
9M6AD—K8ETN	HC8GS—W5OTW
9M8FMF—W1YRC	KC4AAD—K7YMG
HB0XSB—DJ0KB	KC4USP—K3BPP

REGULAR SKEDS

The following stations have skeds as shown:

BV2A—14022 c.w. xtal, Fridays 1500 to 1600z,
FB8ZZ—14115 s.s.b. daily at 1730z wkg. Europe with FB8WW
HC8GS—14130 s.s.b. daily at 2330z with VE3IG.
MP4BHH takes list for FR7ZU/G at 0330z on 14169 daily.
HV3SJ—14375 s.s.b. regularly 1530z with 9N1MM
JD1ABO tries for 21270 s.s.b. 0000z each Sunday.
KW6AA—14305 Tues. and Wed. 1300z to 1400z (Box 61, Wake Is., 96930)
ZK1MA, Manihiki, reported QRV daily 14180-190 0700 and 0800, working to list taken by several JAs at 0650 and 0750.
CE0GB—14160/170 Mon., Tues. and Thurs., 0730 to 1100z.
JY1—21367 1830z daily with G3UML. Wait until sked is completed before chasing a QSO.

A later issue of Geoff Watts DX News-sheet says that ZK1MA has AX2JW and ZM6NH compiling lists on alternate days for this area on 14195 at 0300z So take your pick, he always seems to be on the air

One final piece of news just to hand, is that the WA5UHR Golden Microphone Award for October has been given to Bert Iseman, VE3EUU

Of necessity, I have to terminate this issue at this point. I will however be preparing notes for the January issue, but due to the Christmas arrangements, they will close well in advance of the normal time. I would like to thank at this time all the chaps who have assisted me with this column over the past year I hesitate to mention names in case I miss anybody but a special word of thanks to George Studd, of the N Z A R T, for his monthly notes. to Steve Ruediger for a well compiled tape of loggings direct from his rx, Jack 3AXQ and Tom 3BBC down at Tatura, Don 3AKN Barry 5BS Peter 3APN, Maurie Batt. Mac Hilliard. George Allen, Eric Trebilcock, the Long Is. DX Assn., Geoff Watts, the boys from the I.S.W.L. in London, in particular Bernard Hughes, who regularly sends out a tape full of news, and the many others who have assisted along the line. To all who have assisted, my very sincere thanks, to all readers and helpers I wish the very best for the Festive Season, and may the following year be a very happy one for you all.

73 and good DX, de Don WIA-L2022.

— · · · —

R.S.G.B. SUB. INCREASE

As notified by R.S.G.B. communication of 27th October, 1970, the subscription for a Corporate Member of the R.S.G.B. and for receiving their magazine "Radio Communication" will be raised to $8.80 as from the list to be forwarded to R.S.G.B. for January 1971. This means that any subscriptions received by W.I.A. Federal Executive Publications Department after 6th December, 1970, will be at the new rate and members wishing to become members of the R.S.G.B. are advised to get their applications in before that deadline date.

—Alf Chandler, VK3LC,
Publications Manager

VHF

Sub-Editor: ERIC JAMIESON, VK5LP
Forreston South Australia, 5233.

Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK4	144.390	VK4VV, 107m. W. of Brisbane.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty
VK6	52.006	VK6VF, Tuart Hill
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker.
	145.000	VK6VF, Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.930	VK7VF, Devonport.
VK9	146.000	VK9XI, Christmas Island.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.
HL	50.100	HL9WI, South Korea.

As the DX season is right upon us, I have included the beacon being run by HL9WI, the 50.100 frequency is used all day and up to 1930, then a frequency change to 52.010 MHz. for the evening. It is c.w. and s.s.b. and has a 15-second break-in period.

From the VK6 V.h.f. Group News Bulletin comes news that Malaysian (9M2) operators are now licensed to work on 50 MHz., so this is another direction to keep a watch on. Interesting to note also that JAs were worked in Perth on 16th October.

The VK6 Bulletin also advises that those inexperienced in selecting beam headings and wanting to point north for DX, should get up at dawn, stand with the right arm outstretched to the side, and pointing at the sun. While in this position, look straight ahead, that's north. When using this method be sure to do that "look straight ahead" bit, as one character who used this method kept looking at his right hand, with the result that all he worked were VK2, VK3 and ZL!!

A short letter from David VK8AU in Tennant Creek says there was a good peak to JA toward the end of Sept., but things have gone a bit quiet in that region during Oct. On 8th Oct. he worked Mike JA1MAS at 2230 on 6 metres, signals 4 x 3, running 10 mW. output. The signal was further reduced in power and was still detectable at 1 to 2 mW. s.s.b.! (That's real economy.—5LP.) HL9WI continues to be very popular, working him 11 times between 22/9 and 7/10. His meteor scatter experiments with Doug VK5KK and Wally VK5ZWW are still continuing. Signals to Wally are generally weak with some occasional good bursts. He reminds those interested in meteor showers that the Geminids occurring Dec. 9 to 14 should be quite good from 1930 to 0930, with a peak between Tennant Creek and Adelaide from 2200 to 2330. Suggested techniques for this form of contact were outlined in Sept. 1970 "Amateur Radio".

With DX just around the corner, John VK-4ZJB advises he will be operating on 53.200 MHz this season, running 150 watts to a 10 element wide spaced yagi. Suggests you tune that high, "where the t.v.i. drops off."

The Geelong Amateur Radio-T.V. Club will be operating portable during the DX season using the call sign AX3ATL/P from high locations in the Geelong area, using 6 and 2 mx, after the Sunday morning broadcasts. This station could provide some interesting short skip contacts to Adelaide, Sydney and Hobart on 6, and to plenty of places on 2 mx.

ROSS HULL CONTEST

Following representations made by the VK3 V.h.f. Group, through their Federal Councillor, regarding opening and closing dates of the Ross Hull Contest and subsequent submissions to Federal Contest Manager, who gave consideration to the fact that the early termination in January deprived many of an opportunity of participating in this Contest during their holiday period, whilst bearing in mind that often good openings occurred early in December, it was decided to effect two changes for the 1970/71 Ross Hull Contest, viz.:

1. The starting date will be Saturday, 12th December.

2. The finishing date will be Sunday, 24th January. The overall effect of this is to lengthen the time in which contestants may select their log. Perhaps it would be timely for me, as V.h.f. Sub-Editor, to point out that generally there has been reasonable participation by v.h.f. operators, but a very unreasonable percentage of submission of logs to the Contest Committee. I don't think anyone would doubt that the Ross Hull Contest helps materially to keep the v.h.f. bands alive for several weeks, certainly during the period of maximum DX openings, it helps to create interest across the Tasman in ZL land. For the 2 mx man, the fall off in sunspot numbers generally means an increase in activity on that band, and the contacts to ZL will come again, never fear. Who is going to be the first to take away the present record from Hughie VK5BC?

VK3 V.H.F. CONVENTION

Looks as though the recent convention was successful, after being bolstered up by the VK5s, ten of whom attended. Noted with interest the results of the 432 MHz. antenna gain contest, in which the 32 element extended-expanded array of Peter VK3ZYO took the honours with a gain of 16 dB., closely followed by a similar one made by Bob VK3AOT with 15 dB. gain. The skeleton slots seemed to score poorly. I won't add further on the subject of the convention as I understand this will be the subject of a separate article later.

SEPTEMBER 27

This was the date of a Field Day in VK3 and the annual V.h.f. Field Day in VK5. The winners in VK3 were 3AUI and 3AWV, who shared first place, both being portable at Mt. Cowley, 80 miles s.w. of Melbourne. The VK5 winners were the combined efforts of Bob VK5ZDX and Wally VK5ZWW, who operated from Dingabledinga, 35 miles south of Adelaide. This was the third successive win for this team! Bob VK3AOT comments: "Due to lousy conditions no contacts were made with VK5s." As pointed out last month, the same applied in VK5.

PORTABLE OPERATION

As other news is somewhat scarce this month, I propose devoting some space to information about a proposed portable operation which should be of Australia-wide interest. It is that proposed by Bob VK3AOT, who will be operating from Mt. Cowley, 80 miles s.w. of Melbourne at an elevation of 2,200 feet, from Saturday 19th Dec. to 11th Jan., 1971. Bands. 6 mx a.m./c.w., nominal 52.100 MHz., 150w. to 4 el. yagi. 2 mx a.m./c.w. plus v.f.o., nom. 144.050, 150w 10 el. yagi. 432 MHz. s.s.b. 432.392 20w. p.e.p. output to 15 el. yagi; f.m./c.w. v.f.o., nom. 432.150, 20w. output. 576 MHz.: f.m./c.w. v.f.o., nom 576.200, 20w. output to 32 el. ext. array. 1296 MHz. f.m./c.w. v.f.o., nom. 1296.350, 5w., output to 3-ft. dish. In addition, Ch. A, B, C and 4 f.m., 10w.

Operating times: 0730 beaming Adelaide on 2 mx, 0900 on Albany, 2 mx; 1430 on VK6 on 6 mx; 1730 on VK4 on 6 mx; 1800 on VK8 on 6 mx; 1900 on VK7 on 2 mx; 2015 on Melbourne on 432 s.s.b.; 2100 north on 2 mx, 2300 Adelaide on 2 mx. There will be alternating periods calling CQ and listening.

Bob would like to make skeds with interested stations with a view to attempting contacts on 576 MHz. and 1296 MHz., particularly in the Adelaide direction. He also advises that during very good 6 mx openings to VK4 other skeds will be abandoned and he will run an automatic call sign sender on 144.050, with frequent periods of listening on both 6 and 2 mx.

Bob wants it to be widely known that he will not be using his period of portable activity at Mt. Cowley to count as a score in the Ross Hull Contest. He will, however, give numbers to those wanting them. His main purpose is to stimulate interest in working on as many bands as possible and will go all out for long distance 2 mx contacts if the occasion permits, even having his eyes on David VK8AU in Tennant Creek.

MEET THE OTHER MAN

You might think it was co-incidence that following the information on the Mt. Cowley operation above, that this month Bob VK3AOT should be featured, but this has been planned for some months following my being let into an early secret of planned operation over the DX season! So there are no apologies. Bob Halligan, a P.M.G. engineer, lives at 41 Windsor Ave., Mt. Waverley, at an elevation of 359 feet, in an area where stringent council regulations make it difficult for him to erect some of the antenna systems he would like, hence his keen interest in portable operation. He was first licensed in 1966 with the call sign VK3ZVV, and operates on 52, 144, 432, 576 and 1296 MHz.

On 52 MHz. he runs 150w to a pair of 829B valves, using a 4 el. yagi up 30 ft., modes a.m./n.b.f.m./c.w. Similar modes are used on 144 MHz., running 150w to a YL1060, and a 12 el. yagi up 45 feet. On 432 MHz., he changes to s.s.b., with 40w p.e.p. to a 3/20, antenna a 32 el. extended-expanded collinear, 32 ft. high. He uses VK3 V.h.f. Group FET converters on each of these bands for receiving, fed into a 13-valve home-brew rx. On 576 MHz. he uses another FET TIS88 converter, a MA4060A varactor quadrupler to a dipole antenna for transmitting. So far receiving only on 1296 MHz. with a home-brew solid state converter with 1N21E diode to 3-ft. parabolic reflector antenna. All of this equipment can be set up in a caravan for his portable operations and obtains power from a motor driven alternator.

States worked to date on 52 MHz. are VK1, 2, 3, 4, 5 and 7; on 144 MHz. VK1, 2, 3, 5, 6 and 7. On 432 MHz. VK3, 5 and 7. 576 MHz. VK3 only. He was the first VK3 to work VK6 on 2 mx and this was during the big opening to VK6KJ on 2/2/70. He also was the winner of the phone section of the 1969-70 Ross Hull Contest, and holds V.H.F.C.C. for both 6 and 2 mx. Bob is currently Publicity Officer for the VK3 V.h.f. Group (a job which he does very well—5LP) and formerly had charge of sales of the Disposals Committee.

Looking to the future, Bob says his aim is to achieve Worked All States on 144 MHz., to concentrate more on 1296 and 2300 MHz., to attempt moonbounce on 432 (when able to move to an area more suited for antenna erection), and to continue to go out portable and provide a contact from that end for those interested from some other end!

And now a reminder that the AX prefix ends on 31st Dec. There are plenty of v.h.f. operators looking for that 100 AX contacts. Due to the lateness of any form of participation in the Cook Bi-Centenary Award being made available to them most of the DX from last season was gone. The early part of the forthcoming DX season will be their only opportunity to add to their score. I suggest as many v.h.f. operators as are willing should use the AX prefix until the end of the year.

Bob VK3AOT

NTH. HEMISPHERE PROPAGATION

From George VK3ASV comes some interesting information of propagation relating to the Northern Hemisphere, which experienced their best summer solarise sporadic E season for 18 years, with 50 MHz. openings almost daily, beginning at the end of April, being a record breaking Es season for the U.S. with 90 consecutive days open, and some multi-hop skip on 6 mx, with many times the Es M.U.F. reaching to 150 to 170 MHz., thus giving the following 144 MHz. openings:

- 10/5/70—W5 to W9, 800m. path with rapid flutter.
- 16/5—W5 to W9, W3, up to 743m. with erratic signals for 52 mins.
- 15/6—JA3 to JA8, up to 1300km. for 60 mins. (M.U.F. 150 MHz.)
- 28/6—W5 to W3, W8 for 40 mins.
- 1/7—U.S. Es opening on 144 MHz.
- 9/7—W5 to W6, 1300m., nothing shorter than 1200m.
- 11/7 W5 to W2 for 5 mins.
- 21/7 JA8 to JA4, 1550 km. for 25 mins.
- 25/7 JA8 to JA5, 1900 km., 25 mins. (M.U.F. reaching 204 MHz.—JA t.v. Chan. 10).
- 8/8—JA8 to JA7 for 38 mins.

George continues, "This Northern Hemisphere season was quite a contrast to last year, which started very late May and with only six consecutive days open, with frequent multi-hop 6 mx openings but no 2 mx Es skips recorded. The first 2 mx Es openings ever recorded took place in June 1951 when W6 worked W5 over a 1400m path. This leads us to ponder here, do we follow the northern hemisphere, if so, we could be in for an excellent season, but Es being what it is, 'sporadic', I believe after studying Es over good and bad years between the two hemispheres it seems to be there is no connection, we neither lead or lag, however it is suggested all VK and ZL stations try and set themselves up on 6 mx this summer, fixed and mobile, so if there are some excellent openings, there may well be some on 2 mx as well."

(continued on page 22)

VHF NOTES

(continued from page 21)

George advises the Eastern Zone (Gippsland) v.h.f. boys have spent the winter constructing some very nice solid state gear for both v.h.f. and u.h.f., and generally upgrading their stations. Stations in the area will be on the lookout for contacts on 144.180 and below from 1900 onwards. Also during periods of intense 6 mx openings look for Gippsland 2 mx stations on 144.035 and 144.188 MHz. By next summer the Eastern Zone boys hope to have a 2 mx beacon running. (That's really good news.—5LP) 14 different stations will be active on 6 mx from the Eastern Zone this season, and on 2 mx you might care to look for any of these: VKs 3ASV, 3YBY, 3ZNB, 3AXM, 3ZXQ, 3ZQC, 3ZAB, 3BBB, 3DY and 3KR, while those experimenting on 432 MHz. are 3ZQC, 3ZXM, 3ASV, 3YBI, 3KR, 3BB, 3YAX and 3ZNB.

Thank you George for filling in the gaps in the VK3 activity and this will now give those interested in short skip contacts plenty of opportunities.

Colin VK5DK (formerly VK5ZKR) of Mt. Gambier advises the South East Radio Group will be manning a portable expedition to "The Bluff," 14 miles west of Mt. Gambier, over the New Year holiday week-end, operating on all bands from 80 metres through to 1296 MHz.! The station will be using the Club call sign VK5SR. Colin advises further information next month, and with the earlier publication of "A.R." for January, the information should get to readers ahead of the actual week-end involved.

Finally, the Festive Season draws near. I take this opportunity of wishing you all a very happy and prosperous Christmas and New Year period, with plenty of DX, and s.s.b. transceivers in your Christmas stockings. Many thanks to those who have helped these pages along during the year with notes and snippets of information. Please keep it coming, it's your page, let me hear from you.

Thought for the month: "A good many men still like to think of their wives as they do of their religion—neglected, but always there." That's all until next month. 73, Eric VK5LP The Voice in the Hills.

☆

CONTEST CALENDAR

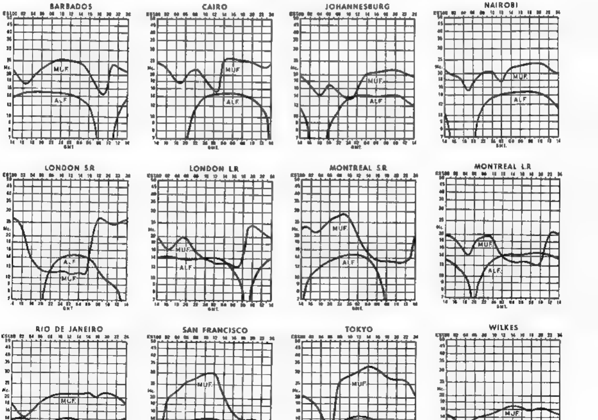
*12th Dec., 1970 to 11th Jan., 1971: Ross A. Hull V.H.F. Memorial Contest.

13th/13th Feb.: John Moyle Memorial National Field Day Contest.

* N.B.—The dates initially published in the Contest Calendar have been altered to those shown above.

PREDICTION CHARTS FOR DECEMBER 1970

(Prediction Charts by courtesy of Ionospheric Prediction Service)



Overseas Magazine Review

Compiled by Syd Clark, VK3ASC

"BREAK-IN"

August 1970—

The Radio Apprentice, ZL2ALC. This article is an explanation to the school-leaver of what is required of him should he wish to become a radio/t.v serviceman.

A Tale of Two VFOs, ZL2AMJ. Designed to give the usual one-handed transceiver two hands.

Aerial Gain, ZL2ACF. The meaning and measurement of this parameter.

Circuit Accessories for the ZL2BDB Solid State Transceiver, ZL2BDB. Vox, calibrator, three-watt audio output amplifier.

An Experimental Panoramic Receiver, ZL-2AMJ. An aid to seeing where the others are on the band.

Multipurpose Multivibrator, ZL2ARP. Solid state versions of old friends.

"CQ"

September 1970—

Digital CQ and Meteor Scatter Data Generators, G3MNQ. Part 1 of a two-part article on the subject of digital techniques of generating morse code. This article covers the basic building blocks used.

1969 DX-pedition to Heard Island, W7ZFY, ex VK0WR. Most DX-peditions seem to take place to palm fringed tropical islands. Here is one that went into the freezer.

"CQ" Reviews the Drake TC-6 Six Metre Transmitting Converter, W2AEF. Running 300 watts input to three 6JB6s, this transverter is designed to be driven by a low power 14 MHz. exciter.

Constructing Low-Loss Co-axial Transmission Line, VK4ZT. This article also appeared in "A.R." a short time ago.

Using the Slide Rule to Determine L-C Circuits, WA3GGH. A lesson in slip-stick working.

Barry Tours Viet MARS Stations, Don Dedera. The story of the tour of Senator Barry Goldwater, K7UGA in Vietnam.

Motorising Your Crank-up Tower, KH6IJ. A way of saving breath and cracked knuckles.

"CQ TV"

August 1970—

A Video Plus Sound Modulator, by A. Maurer, HE1TA.

Television Camera Amplifier using the FET, Mullard Ltd.

Integrated Circuits, A. W. Critchley. Using digital integrated circuits for t.v. pulse generation circuits.

A Low Power Transmitter, GW3JGA/T

"OHM"—The Oriental Ham Magazine

July 1970—

Divided We Fall, HS5ABD. The author considers that future allocations conferences could deprive active Amateurs of their h.f. bands.

RSA to Watch Spacecom Meet. Dealing with approach to H.A.R.T.S. by the Federal President of the W.I.A. (Michael J. Owen).

Mini Expo '70, JA3ER. Over 8,000 Amateurs visited the J.A.R.L. Club Station JA3XPO at Expo '70, located in the San Francisco pavilion at the fair.

Power Supplies, KR6JT. Reviews the various power supply circuits.

Sea Rescue. The follow up story to the rescue of Jens Jensen W4AMG/MM and wife Keiko.

"QST"

August 1970—

A Complete Solid State Portable for Forty Metres, W3KET. A portable/emergency c.w. station designed with certain requirements in mind. Here is a suitable station in a small package at minimum cost.

Once More With QRP, W1CER. This is a second generation QRP "machine", designed and built in answer to many requests for a v.f.o. controlled version of the transceiver described in March 1970 "QST".

MABAV Mobile Antenna, K1KLM. The Mobile All Band Amateur V is the result of a search for high efficiency. We are sure this is a different antenna system.

Short Antennas for the Lower Frequencies, Part 1, W0JI. As operation on the lower frequency bands increases, this article is timely. Part 1 reviews the characteristics of short antennas and discusses means for tuning them.

A Different Way To Get On Fifty MHz. Sideband, W1HDQ.

5 Over 5 for Six, WB2GXF. Describes an easily built stacked 50 MHz. array.

Up Dating the SP-600, W1KLK. Describes alterations he made to an SP-600 (Hammarlund) receiver to make it capable of receiving s.s.b., etc. Since this receiver is a later design than the AMR100, which was made in Australia during the war, some VKs may be interested.

The Operational Amplifier, W0TCU. Part 1 describes a device which is in quite common use amongst the pros. Use in Amateur gear is increasing.

September 1970—

A Solid State VOX, W1KLK. Here is an easy to build circuit that is suitable as an outboard accessory, or it can be built into your next transmitter.

Short Antennas for Lower Frequencies, Part 2, W0JF. Trap construction and adjustment.

New Apparatus, W1CP reviews that "VK-3ASC" Spider Quad Hub.

A Two Band Vertical for the Novice, by WN6MBP. An antenna which is ideal for the newcomer to Amateur Radio. Inexpensive and requires small space.

A QRP Console, W1CER. Combining low power s.w.r. meter with universal pi-section coupler. The speaker is also mounted in the console.

U.H.F. Directional Couplers, W2CQH and W2IMU. The ordinary "Monimatch" type instrument will not work satisfactorily at v.h.f./u.h.f. Here are special designs for these bands.

Automatic Amplifier Tuning, W8PHR. An electronic system for maintaining tank circuit resonance.

A Solid State Contest Receiver, W2NH. All you need to win is a good tx and a location with a four element beam on a 100 ft. mast on top of a mountain, plus a great deal of application.

C.W. Break-in for the Collins S/Line, K0AZJ and W0INH. The authors guarantee that this mod. will enhance the value of your Collins.

The Operational Amplifier, WA0TCU. Part 2. Some practical circuits.

"RADIO COMMUNICATION"

August 1970—

A New Approach to V.H.F./U.H.F. Receiver Design, G3NNG. All solid state, trough lines, and other modern techniques.

A Noise Limiter for Transistorised Receivers, G3XGP. The title tells.

A Wide Range Crystal Calibrator using Integrated Circuits, G3TDT. You'll have to read all of the words to know where the harmonics cease.

Modifications to the Self Contained Linear Amplifier for 144 MHz., G6JP.

A 10 MHz. V.F.O., G3MNQ. Especially designed for those who do not like doublers after 5 MHz. v.f.o's.

Technical Topics, G3VA. In this issue of this monthly feature, Pat Hawker discusses methods of preventing interference with hi-fi equipment, a transistor microphone amplifier circuit, factory built synchrodyne transceiver, silicon diodes, and a low power dummy load in a BNC plug.

T.V.I. Tips, G3JGO. Transistors, cross modulation and cures are discussed.

"SHORT WAVE MAGAZINE"

July [illegible]

Clean C.W. Keying, G6HL. The importance of good shape factor. How to achieve satisfactory keying at reasonably high speeds without causing clicks. The subject is discussed in detail and circuits are shown for the tx and a c.r.o. to test the tx.

Electronic Morse Code Generators, Part 2. Flip flop circuits and decode dividers.

QSY Down with a Crystal, G2QY. A method of reducing a crystal's frequency of oscillation by loading with India ink is described.

Narrow Band Frequency Modulation, G3OGX. Using a BA102 varicap. Circuit is simple and straightforward.

Modification for the H.R.O., P Talbot. Cascode r.f. stage circuit.

Mechanical Design for QRO V.H.F. Transmitter, G3YUA. Guidance on the layout and construction of a transmitter.

August 1970—

Transmitter Output Control Unit, G6HL. Incorporating aerial changeover and switching, s.w.r. indicator and dummy load.

Notes on the Trio JR-500, G3KFE. Describes 1.8 MHz. mod. to this receiver.

About S.W.R. Indicators, VK1AU. Reprint of article from "A.R.," April 1970.

Two Metre Transmitter in Kit Form, G8ATK. P.C.B. design for a club project.

Electronic Morse Code Generators, G3MNQ. Considerations of circuit design for a sender.

"THE INDIAN RADIO AMATEUR"

June 1970—

Perhaps some of the readers of "A.R." took particular note of an article stating that there is only about 450 Radio Amateurs in India. Considering the small number of Amateurs in that country, it is commendable that they manage to publish a regular magazine for the purpose of bringing news and notes to the Indian Radio Amateur and to print articles of local and overseas origin which appear to be of interest to the VUs.

"THE AUSTRALIAN E.E.B."

August 1970 (Vo. 6 No. 6)—

Articles include C D Ignition (Part 1.; Auto Ignition Interference; Pseudo High Voltage Transistor, The Real Meaning of Radiation Resistance, Better Butter and Cake, Back to Front Voltage Regulator; Television Servicing (Part 2), FET Gate Dip Oscillator and Calibrator, Improved Fire Lighter, Amateur versus Hams. Review copy from The Australian E.E.B., P.O. Box 177, Sandy Bay, Tas.

"VHF COMMUNICATIONS"

August 1970—

A S.S.B. Transceiver with Silicon Transistor Complement, DL6HA, Part 3. Describes the 9-14 MHz. transmit-receive converter, the 14-144 MHz. transmit converter module with linear amp., and 5 MHz. v.f.o. and l.p. filter.

Experiments with a Crystal Discriminator, DJ4BG. Crystal discriminators are used extensively in commercial communications equipment.

A Universal V.H.F.-U.H.F. Transmitter for A.M. and F.M., DL3WR. Continued from edition two.

Co-axial Low Pass Filters for V.H.F. and U.H.F., DJ3QC. Hans describes the various types which can be made and how to make them. Dimensioned drawings are given.

Electronically Stabilised Power Supply with D.C.-D.C. Converter, DJ9ZR.

A Simple Rotary Co-axial Joint, DC8OH. This joint is made from SO239 and PL259 parts with the addition of a few steel balls and a spring.

Review copy from Paul B. Jackson, 37 Minkara Rd., Bayview, N.S.W., 2104.

"73"

August 1970—

Mount That Mobile Right, K4IPV. The right kind of mobile installation will result in bigger signals, better operator safety, and more fun in hamming on the road.

Amateur Wattmeter for $3.85, K1CLL. Comparing lamp brilliance with a standard tells you power output from 10 mW. to 5W., over the range from 160 metres through 450 MHz.

Consummate Console, WB2FBF. How to increase the efficiency and enjoyment of your station by building a broadcast-style operating console.

An Impedance Multiplier for the VOM, by K8DQB. How to build a handy integrated-circuit device that turns your voltmeter into a VTVM.

Repeater Audio, Time Out for Quality, by K8MVH. Methods for improved audio patching in f.m. repeaters, with circuits for cathode and emitter followers.

ATV, Getting a Better Picture, WA6BJV. Up-grading systems by using better antennas, feeders and converters.

That Contest Craze, VK4SS. A lot can happen between the thought and the deed.

Log Periodic Designs for V.H.F.-U.H.F., by W3DUQ. Spacing, dimensions and construction data for log antennas from 21 to 450 MHz.

Ham Radio Chess, W1EMV and W0BMW. Two notation systems for a pastime that's growing in popularity.

V.H.F. A.M. Transmitter, Brubaker. Plans for a miniature rig using low-cost transistors.

Raising a Rhombic, W8DYF. Problems of putting up one of those big ones.

The IC-mitter, Goldstein. Microminiaturisation that gives a.m. or c.w. on 20 through 160 metres.

General Class Study Course, Staff. Another chapter is a continuing technical series designed to help U.S. Hams up-grade their licences through improving their knowledge of theory.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

RE COOK AWARD 1970

Dear OM,

At the time of sending in my application for the "Cook Award" I left out a letter which I had written to accompany the list, but I omitted to enclose same.

While I am not yet in receipt of my Certificate, I do wish to state that this has been one of the most interesting awards that I have taken part in. I have been on the sick list for almost two years with a severe coronary and to quote the words of my Doctors, "This Cook Award has been your life saver, in giving you an objective to go for." It is on these grounds, that I wish to express my most sincere gratitude and also to your fellow Australian Hams. I consider, that you have all shown how Ham Radio should be conducted, the courtesy shown in every QSO without exception has been a great pleasure. How I wish it were possible to be able to make this known to all AX/VK Amateurs.

Again my most sincere thanks to you and all fellow Hams. I believe it to be true what my Doctors have said, you will therefore appreciate my deep sense of gratitude. I was not able to enclose any IRCs by virtue of my not having at present any income other than my State benefit.

—Frederick J. E. Bolton, G3VTQ.

"MORE HOWARD RYDERS CAN HELP"

Editor "A.R.," Dear Sir,

I was very interested to read the Editorial in the November issue because I travelled through India, and many other countries, a few months ago and had lived in Africa for many years. I had the pleasure of meeting VK3XI in Singapore for a brief moment.

The first paragraph of the Editorial sums up a basic truth that hobbies, in general, are alien to the mentality of many tribes and peoples even if some individuals happen to be sufficiently wealthy to indulge in them. In Asia, however, the percentage of "have-nots" is vastly greater than here. In Africa, the percentage is even higher except in the south. Whilst education is a pre-requisite there still remains an almost complete lack of self-motivation.

In some ways India is a misleading example. Take such countries as YA, 7Q7, XW8, 5H3 and 9M6. How many citizens of these countries (i.e. "locals" as opposed to expatriates) are licensed as Radio Amateurs? In India most of the calls are held by locals. This is a question of degree and in no way detracts from the force of the argument. The Editorial dealt with a country a little way up the ladder when compared with the level of Amateur Radio activities by locals in other less developed countries.

Amateur Radio needs more people like Howard Ryder everywhere. But without expatriates there would be a vacuum in many countries. A vacuum, not necessarily caused by a lack of operators or by a lack of gear, but caused by the official attitude towards the hobby. Such an attitude often is the expression of ignorance and fear. Many of us in Africa did much to demonstrate the art of Amateur Radio to the local officials and even Ministers in the hope that the future of licensing might be assured. Unfortunately, locals can and do lose their offices, examples are VQ1, XZ3 and until recently YB.

If the local Ministers are advised by knowledgeable and impartial expatriates the cause of Amateur Radio remains reasonably secure, notwithstanding the high standards required by qualifying technical examinations normally beyond the scope of the keenest local aspirant for a licence. The expatriate establishment also puts in perspective the cries of doom from security wallahs. Sooner than later, however, expatriate posts are localised. When this occurs the continuous interchange of visits with foreign high ranking Amateurs at top levels achieves valuable results. If the remaining few expatriate Amateurs depart without replacement, the temptation to clamp down on licensing is great.

For India, seriously confronted with balance of payments problems and the associated controls over foreign exchange, there exists a need for the supply of components to the right people at a very modest price. Not free aid convertible into golden beds or for lining the pockets of middle men, but aid in kind channelled through, perhaps, Amateur Radio organisations. An evening with the Madras Group convinced me of this. So many youngsters were present who drooled at the sight of a modern transceiver. Amateur Radio Handbooks seemed to be available but any components with which to experiment were very scarce indeed. Any of these Amateurs let loose at such a "junk" sale as I saw recently at the Adelaide W.I. would have gone [illegible]

For the other countries lower down the rungs of the ladder, there seems to be little real answer except time. A continuous succession of Howard Ryders can help. Getting at the local whilst he is in training overseas can help. Insuring that expatriates can always get licences, **including reciprocal licences for visitors**, can help provided the applicants are qualified of course. The removal of import prohibitions (as distinct from import restrictions) on transmitting apparatus is a basic pre-requisite, the Dip. bag method of importation into some countries is the only mode open to the resident!

Visits overseas by your President are very valuable in this Region of relatively sparse Amateur populations when viewed against the background of pressurisation by commercial and other interests for the allocation of spectrum space. I would suggest, however, that government authorities must accept much greater involvement with such visits. The creed of isolationism never dies and seldom pays dividends.

—Peter B. Dodd,
Life Vice-Pres., Radio Soc. of East Africa,
VK5CIF, VK8CIF, YA1PBD,
GD3PBD, 7Q7PBD, VQ1PBD, etc.

DARWIN RADIO CLUB AT EAST POINT

Editor "A.R.," Dear Sir,

Please accept my many apologies for the error I made in the article I wrote on the Darwin Radio Club, printed on page 20 of the October 1970 issue.

I said that the Club premises were loacted at Lee Point. This is incorrect. The Club premises are located at East Point, repeat East Points. (D.C.A. have a receiving station at Lee Point—I had been writing various letters mentioning this place and typed the name in error when writing of the Darwin Radio Club.)

East Point is the port war area and commands the entrance to Darwin Harbour. Lee Point on the other hand is north-west of East Point. I am very sorry for this error and have written direct to the President of the D.R.C. (Basil Brodrick, VK8BB) with my apologies for this error. The Darwin boys will probably tar and feather me if I ever return.

—W. A. Easterling, VK2ABL.

P.S.—Thanks for using the article.

SHORT WAVE PROPAGATION COURSE

Editor "A.R.," Dear Sir,

Some members may be interested to learn of a short wave propagation course available at no charge by writing to:

Information Service,
Radio Nederland,
P.O. Box 222,
Hilversum, Holland.

—Malcolm Sinclair,
AX3BMS, ZM3BAA.

SILENT KEY

It is with deep regret that we record the passing of—

VK3SV—James Howarth.

RECIPROCAL LICENSING

The Reciprocal Licensing Agreement between Australia and the United States of America is generally well known. In effect, this provides that an Australian Amateur temporarily resident in the United States of America may be granted a Reciprocal Licence for the period of his stay in the United States of America.

The basis of the U.S. arrangement is that the Australian licensee is permitted to use his own call sign and is expected to comply with the terms of his Australian licence whilst using it in America. It is, however, important to make application for a Reciprocal Licence well before arrival in the United States. The processing of Reciprocal Licences can take between two to three months and there is just no way of shortening this period. Accordingly, Australian Amateurs intending to visit the United States are well advised to make application for a Reciprocal Licence at least three months before the time of their arrival. The Federal Executive is holding the appropriate forms of application and these will be given to members on application to the Federal Secretary.

HAMADS

Minimum $1 for forty words.
Extra words, 3 cents each.

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE.

Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic., 3002, by 8th of the month and remittance must accompany the advertisement.

FOR SALE Compact 2 metre A.M. T/ceiver, s./regen. with R.F stage, 2 watts R.F. out, xtal on 144.45 MHz., complete with xtal mic., A.C. P.S.U., 5/8 wave groundplane, $25 o.n.o. C.F. Networks 9 MHz. Filter, 6-pole, 2.1 KHz bandwidth, with carrier xtals, new, unused, $42.50 o.n.o. 5.4 MHz filter, 2.1 KHz. bandwidth, 4-pole, with U.S.B. carrier xtal, ideal for V.H.F. S.S.B. rig, $7.00 o.n.o. 48 Orchard St., Glen Waverley, Vic. Ph. 232-9492.

FOR SALE FTDX100 Transceiver with set unused valves, excellent condition, best offer. 35-ft. galvanised tower with hinged work platform, heavy duty rotator with indicators, $100. Set fibre glass quad radials, new, best offer. VK3AHS, Telephone Melbourne 550-2559.

FOR SALE. One 829B and socket, $3. Two new 6/40s and sockets, $4 each. One new 6/40 less socket, $3. One 4/65A, $7. Two 4/250As and sockets, $10 each. One 4/250A less socket, $8. One Fil Trans 5v 30a (for pair 4/250s), $10. One Fil Trans 5v 15a (for single 4/250), $5. One Pwr Trans 425v 150 mA., 3 x 6.3v., 1 x 5v., $5. K. Seddon, 7 Wilson St., Brighton, Vic. Tel. 92-5960 (evenings, Melbourne).

FOR SALE: Pair factory matched Mullard 6236 valves (50 watt plate dissipation, replacement for 6DQ5), unused. Very reasonable. R. Vickary, VK4VX, 20 Ingl e St., The Grange, Qld., 4051.

WANTED: The following components from Bendix Radio Compass Receivers Type MN-26: Transformers type T16 (A15064). 24 volt band-change motor assemblies with leads: loop aerials type MN-20. Please state condition and price required. M. O'Brien, Edgar Rd., San Remo, Vic., 3925. Ph. 107.

WANTED: 5-band Sideband Transceiver. 36-ft. telescopic tower and Type 3 Mk. 2. Please advise condition and price. VK3AHG, 20 Grandview Rd., Box Hill South, Vic., 3128. Phone 288-2024.

INDEX TO VOLUME 38—1970